JULY 29, 1961

Chemical Week

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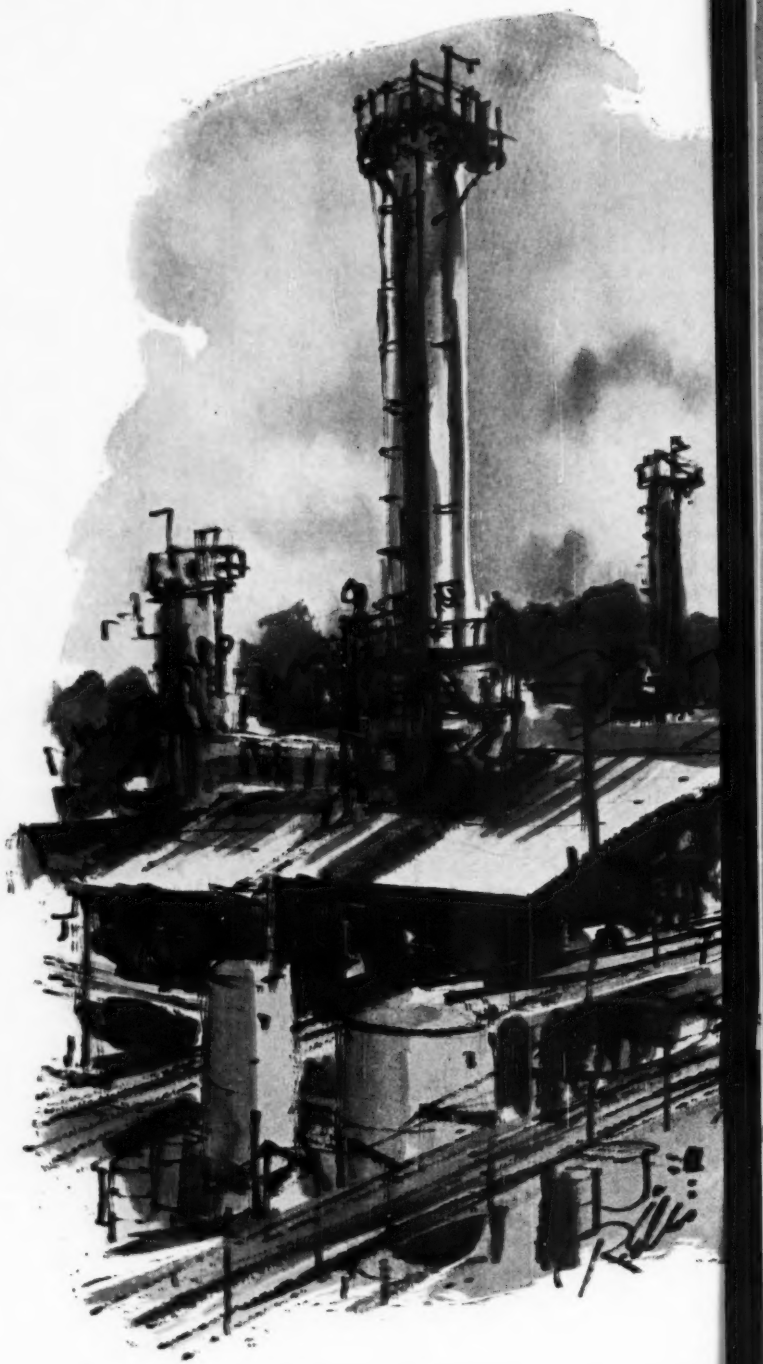

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2. Epoxidation

$$HOCH_2CH{=}CHCH_2OH \longrightarrow HOCH_2CHCHCH_2OH \quad (O)$$

3. Butadiene Dioxide

$$HOCH_2CH{=}CHCH_2OH \xrightarrow{Br_2} HOCH_2CHBrCHBrCH_2OH \xrightarrow{\text{alkali}} CH_2CHCHCH_2 \quad (O\ O)$$

4. Ester formation

$$HOCH_2CH{=}CHCH_2OH + (CH_3CO)_2O \longrightarrow CH_3COOCH_2CH{=}CHCH_2OOCCH_3$$

5. Ether formation

$$HOCH_2CH{=}CHCH_2OH + 2\ \text{C}_6\text{H}_5CH{=}CH_2 \longrightarrow \text{C}_6\text{H}_5CH(CH_3)OCH_2CH{=}CHCH_2OCH(CH_3)\text{C}_6\text{H}_5$$

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Frank Look at Drugs

EMOTIONALISM is inherent in any public discussion of the pharmaceutical industry: it is bound to involve the health—even the life or death—of mothers and babies, stalwart husbands and fathers, poor but proud people in their twilight years. Every string is there for an audience-attuned senator like Estes Kefauver to play on.

It is therefore refreshing to see the subject put in perspective by a man ably qualified to do so, President John T. Connor of Merck & Co. In a recent talk he said, in part:

"I see the future from the point of view of a realistic optimist—one who does not expect growth to be without change, or change to be without pain. It happens that today the industry of which I am part is undergoing a period of searching scrutiny and criticism, both from within and without. This sort of stock-taking does not indicate weakness or internal confusion. The problems the industry faces are legion and grave. I can do no more than simply identify some of them.

"(1) There is the problem of intense foreign and domestic competition, which sometimes leads to excesses in promotional practices. . . .

"(2) There is the problem of counterfeiting of drugs, traffic in [which] has become big underworld business in the United States.

"(3) There is the problem of mandatory generic-name prescribing. The key word is "mandatory." The pharmaceutical industry does not object to generic prescribing *per se,* [but] . . . doctors must be permitted to continue to exercise free choice in prescribing medications. The best guarantee of drug quality remains the reputation of the manufacturer.

"(4) There is the problem of adequate trademark and patent protection. Radical legislative proposals, which include the provision that patent protection for new drug discoveries be reduced from 17 to three years, gives evidence that this threat is not theoretical, but real. Such a proposal completely ignores the economics of drug-company research.

"(5) There is the problem of harassment and unwarranted intervention through legislation and regulation, both federal and state. Let there be no mistake: the industry supports the concept of responsible regulation. However, certain of the legislative proposals now pending before federal and state bodies—if enacted into law—would severely hamstring the industry without . . . significantly greater protection for the public.

"(6) There is the problem of strengthening the processes and relationships involved in getting valid clinical data on new therapeutic agents. In this matter, the pharmaceutical industry is increasingly dependent upon resources outside its own laboratories. Yet, the specialized facilities for carrying out such research are limited indeed.

"(7) There is the problem of inadequate communication. The public, the health professions, government, and indeed all segments of our society are substantially unaware of the nature of our business. They know little of the contributions we make and have made, the problems we face, and the steps we are taking to meet these problems on our own initiative. We are to blame for this communications failure.

"Like man, an industry has ages. Also like man, an industry's ages have certain characteristics associated with them. One does not have to feel apologetic if, as he looks back at the growth process, he is able to perceive mistakes that have been made along the way. The important thing is that his mistakes have contributed to his maturity, and now he stands ready to accept his responsibility as a citizen and to meet his obligation to act fully in the public interest."

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LETTERS

French Spelling Lesson

To THE EDITOR: Your magazine properly gives quite a good proportion of its space to international news. Today, what happens in Europe or Japan or Latin America is important to us here in Canada or in your country. Nevertheless, you tend to weaken your own authority in foreign coverage when you use foreign words and misspell them. I am referring to the word "publicitie" in your headline (*July 8, p. 33*). It should be "publicité," of course.

DONALD MACLEOD
Montreal, Que.

It only goes to prove what we said in column 3 of the same page: "As might be expected, language presents some of the toughest problems for U.S. companies."—ED.

Plastic Traps' Troubles

To THE EDITOR: As a subscriber to CHEMICAL WEEK, we compliment you on your clear, concise analysis of the plastic situation in your article titled "For Plastics—A Welcome Home?" (*July 15, p. 21*).

We have been endeavoring to introduce a "plastic trap" into the U.S. market, and have met with nothing but excuses as to "codes" . . . "labor," and other hindrances, to avoid the ultimate and final. . . .

As a matter of information, . . . the plastic trap . . . is being adopted extensively in Great Britain.

ALBERT SIMON
A.&R. Simon Co.
New York.

Polyurethane Insulation

To THE EDITOR: I . . . call your attention to a data table (*CW, July 1, p. 61*) with reference to the K factor rating of urethane foam insulation.

The K factor rating of 0.24 at 32 F falls considerably short of the actual performance of rigid urethane foam in this application. We have consistently produced urethane foam of good quality with a K factor reading of 0.11-0.12 at 73 F and, as you know, the factor improves as temperature is reduced.

We have not conducted K factor tests at 32 F but feel certain the reading would be better than 0.10, especially if a fluorocarbon blowing agent is used. . . .

There is a tremendous interest in this urethane foam field, and much of it is based on the superior thermal insulation values attainable with this material.

M. GEORGE SNYDER
Mobay Chemical Co.
Pittsburgh, Pa.

Reader Snyder is right. Our table referred to "Plastics—e.g., polyurethane," but the conductivity figure, used as typical of various foamed plastics, was actually for polystyrene of 1 lb./cu.ft. density.—ED.

MEETINGS

Gordon Research Conferences, July 31-Aug. 4; Colby Junior College, New London, N.H.—medicinal chemistry; New Hampton School, New Hampton, N.H.—steroids and other natural products; Kimball Union Academy, Meriden, N.H.—solid-state studies in ceramics; Tilton School, Tilton, N.H.—electrodeposition.

American Oil Chemists' Society, short course on "Newer Lipid Analyses," University of Rochester, July 23-26.

University of California at Los Angeles, "Statistical Methods in Industry," annual program, UCLA campus, July 31-Aug. 11.

Case Institute of Technology, digital-control systems course, Cleveland, July 31-Aug. 11.

The Chemical Institute of Canada, 44th Canadian Chemical Conference and Exhibition, Queen Elizabeth Hotel, Montreal, Aug. 3-5.

18th International Congress of Pure and Applied Chemistry, Montreal, Can., Aug. 6-12.

Industrial Research Conference, Arden House, Columbia University, Harriman, N.Y., Aug. 6-12.

International Congress of Pure and Applied Chemistry (18th), University of Montreal, Montreal, Can., Aug. 12-16.

Chemical Market Research Assn. meeting, Lake George Sagamore Hotel, Bolton Landing, N.Y., Sept. 10-12.

CW welcomes expressions of opinion from readers. The only requirements: that they be pertinent, as brief as possible.

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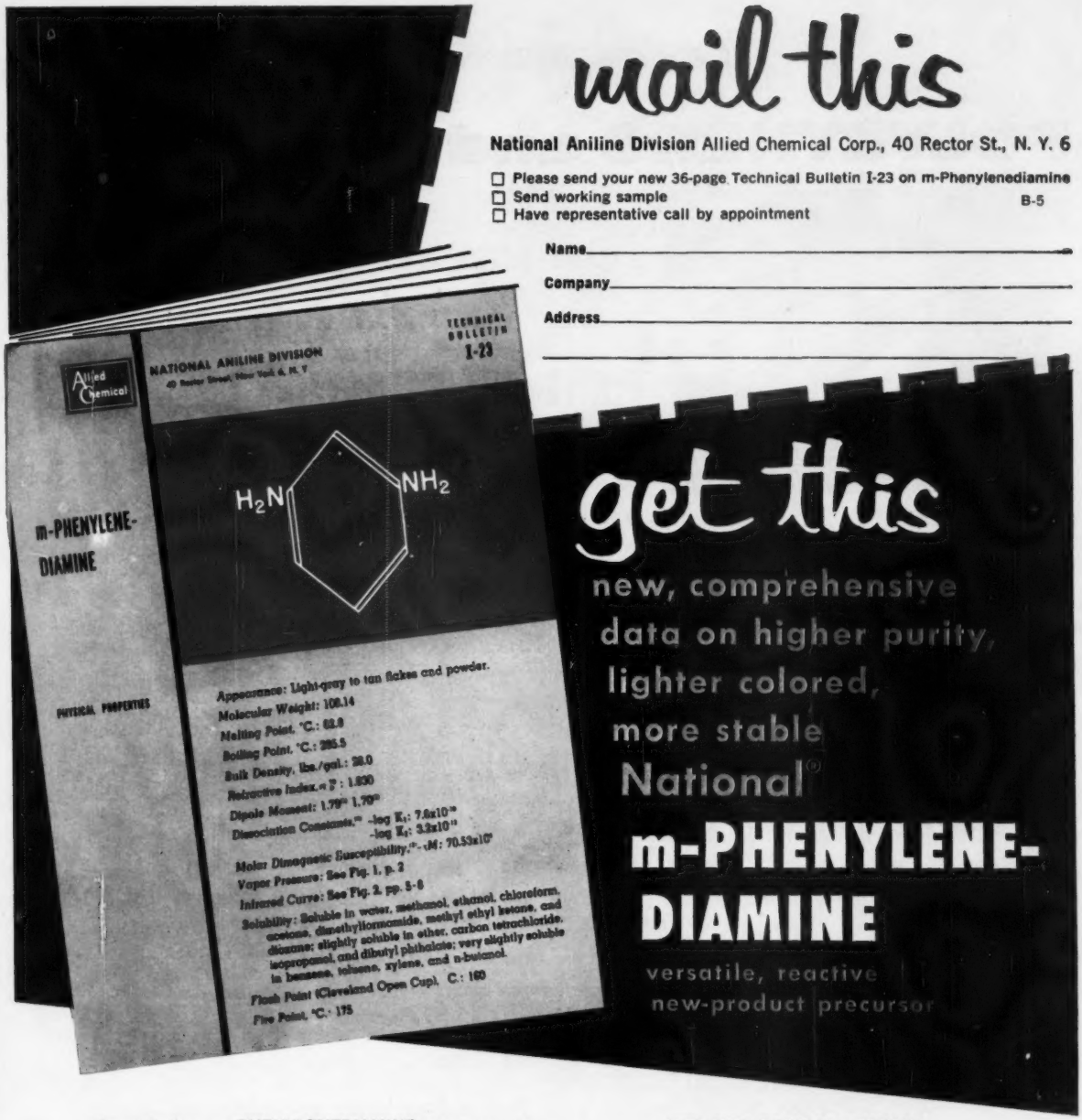
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Molecular Weight: 108.14
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Boiling Point, °C.: 285.5
Bulk Density, lbs./gal.: 28.0
Refractive Index, n D: 1.630
Dipole Moment: 1.79° 1.70°
Dissociation Constants,°° -log K1: 7.8x10°°
-log K2: 3.2x10°°
Molar Diamagnetic Susceptibility,°- -M: 70.53x10°
Vapor Pressure: See Fig. 1, p. 2
Infrared Curve: See Fig. 2, pp. 5-6
Solubility: Soluble in water, methanol, ethanol, chloroform, acetone, dimethylformamide, methyl ethyl ketone, and dioxane; slightly soluble in ether, carbon tetrachloride, isopropanol, and dibutyl phthalate; very slightly soluble in benzene, toluene, xylene, and n-butanol.
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Volatility, wt.%	0.2 max.	0.2 max.	0.2 max.	0.2 max.
Hydroxyl number, mg. KOH/g.	54.5 min. 57.5 max.	107 min. 118 max.	53.4 min. 59.0 max.	39 min. 43 max.
Acid number, mg. KOH/g.	0.1 max.	0.2 max.	0.2 max.	0.2 max.
pH in 10:1 methanol-water solvent	5.0 min. 7.0 max.	— —	5.0 min. 7.0 max.	5.0 min. 7.0 max.
pH in 10:6 isopropanol-water solvent	— —	3.5 min. 5.5 max.	— —	— —
Total unsaturation, meq./g.	0.04 max.	0.03 max.	0.04 max.	0.075 max.
Gel test, flow time, sec.	10 max.	—	10 max.	10 max.
Potassium, ppm.	10 max.	10 max.	10 max.	10 max.
Water at shipment, wt.%	0.1 max.	0.1 max.	0.1 max.	0.1 max.
Ash, wt.%	0.005 max.	0.005 max.	0.005 max.	0.005 max.
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JEFFERSON CHEMICALS

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Business
Newsletter

CHEMICAL WEEK
July 29, 1961

Mounting East-West tension over Berlin is apparently not slowing the Soviet bloc chemical industry's efforts to make a splash in non-Communist areas.

There's word out of London, for example, of a pact reminiscent of the contract signed between a U.S. company, National Patent Development Corp., and Amtorg, the Soviet trading corporation, earlier this month (*CW, July 22, p. 27*).

Humphreys & Glasgow, Ltd., has obtained know-how and licenses for a wide range of East German processes. These include methods of producing and spinning polyacrylonitrile, polyamide, polyester, and viscose fibers. The deal is unusual in that no cash or information exchange is involved. The British company, however, is building a plant for Walter Ulbricht Chemical Works at Leuna, East Germany.

Spokesmen for Humphreys & Glasgow claim that East Germany is "now in the forefront of synthetic fiber production in the world," and that the firm is now able to offer synthetic fiber production and spinning plants based on "most up-to-date East German processes."

•

The flow between England and the Soviet bloc is two-way. Courtalds, Ltd., has a new, $5.6-million contract to construct an acrylic fiber plant at Lodz, Poland. It's the company's fourth order in four years for synthetic fiber plants for Eastern Europe.

With its subsidiary Procindus Ltd., Courtalds has signed a contract with Polimex, a Polish export and import company, under which Procindus will provide know-how, plant and machinery. Capacity of the proposed acrylic plant is not disclosed.

•

First privately owned helium plant in the U.S. on the way. Kerr-McGee Oil Industries has awarded the prime contract for construction of its helium extraction plant (in the Pinta Dome field at Navajo, Ariz.) to Service Engineering of Oklahoma City. The plant, to be the only nongovernment owned helium extraction unit, will turn out about 200,000 standard cu. ft./day. Operation is scheduled for Nov. 1.

The new unit will process raw gas from the Pinta Dome fields; the gas is said to contain about 8% helium. Kerr-McGee engineers calculate that the field has recoverable reserves of 7.5 billion cu. ft. of gas.

•

Thompson Ramo Wooldridge is scouting around for chemical properties. The Los Angeles and Cleveland company, big in electronics, missiles and space craft systems (sales in '60 were over $420.4 million), reportedly has been negotiating to acquire an interest in Pittsburgh Coke & Chemical. This has been denied by TRW officials, but they admit that the company has been talking with a number of chemical firms about

acquisitions. TRW plans to make such chemical industry moves through Magna Products, Inc., in which it has a controlling interest; Magna makes corrosion-control products.

•

Allied Chemical is still considering a joint phenol venture with Georgia-Pacific. Talks have been going on for some time for a plant to be built at Coos Bay, Ore., where G-P has a resin installation. Feedstock for the new phenol project—if it goes through—will likely be cumene.

•

The West Coast's phenol capacity will soon be more than adequate to cover the area's requirements, and trade observers are weighing this situation against the possible Allied-G-P deal.

By year's end, when Dow comes in with its new, 36-million-lbs./year plant at Kalama, Wash. (*CW, March 19, '60, p. 73*) there will be more than 50-million-lbs./year overcapacity on the Coast, according to industry market observers. (Monsanto has 36 million lbs./year at Avon, Calif.; Oronite, about 50 million lbs./year at Richmond, Calif. Consumption in the West is estimated at about 70 million lbs./year.)

Although the companies aren't saying so, one likely reason for Allied and G-P's possible entry into what appears to be an unfavorable market, is the long-term prospect that the plywood industry will make an all-out adhesives switch to phenolic adhesives.

A decision on the joint phenol venture may be some weeks away.

•

Incidentally, Allied and Georgia-Pacific recently hooked up in a study of the commercial possibilities of producing chemicals from wood. G-P has the patents, Allied has the marketing setup. A pilot plant (at Portland, Ore.) is now turning out copper sulfate, nickel sulfate, sodium ferrocyanide and ferric ferrocyanide from bark, sawdust and other wood-process waste.

•

Another blow to Britain's prospects for Common Market participation: in a surprise statement last week, the grand council of the powerful Federation of British Industries—the biggest voice in British trade—came out against the country's applying for Common Market membership until there are better prospects of getting satisfactory terms.

These, says the federation, should include reasonable concessions to Britain's Commonwealth partners, and adjustments of the Common Market's social, political and agricultural policies. The statement comes in the wake of mounting Conservative opposition to Britain's entry that was stirred up by negative reactions in the Commonwealth (*CW Business Newsletter, July 22*). It's especially significant because British businessmen have been among those pressing for union with the European bloc.

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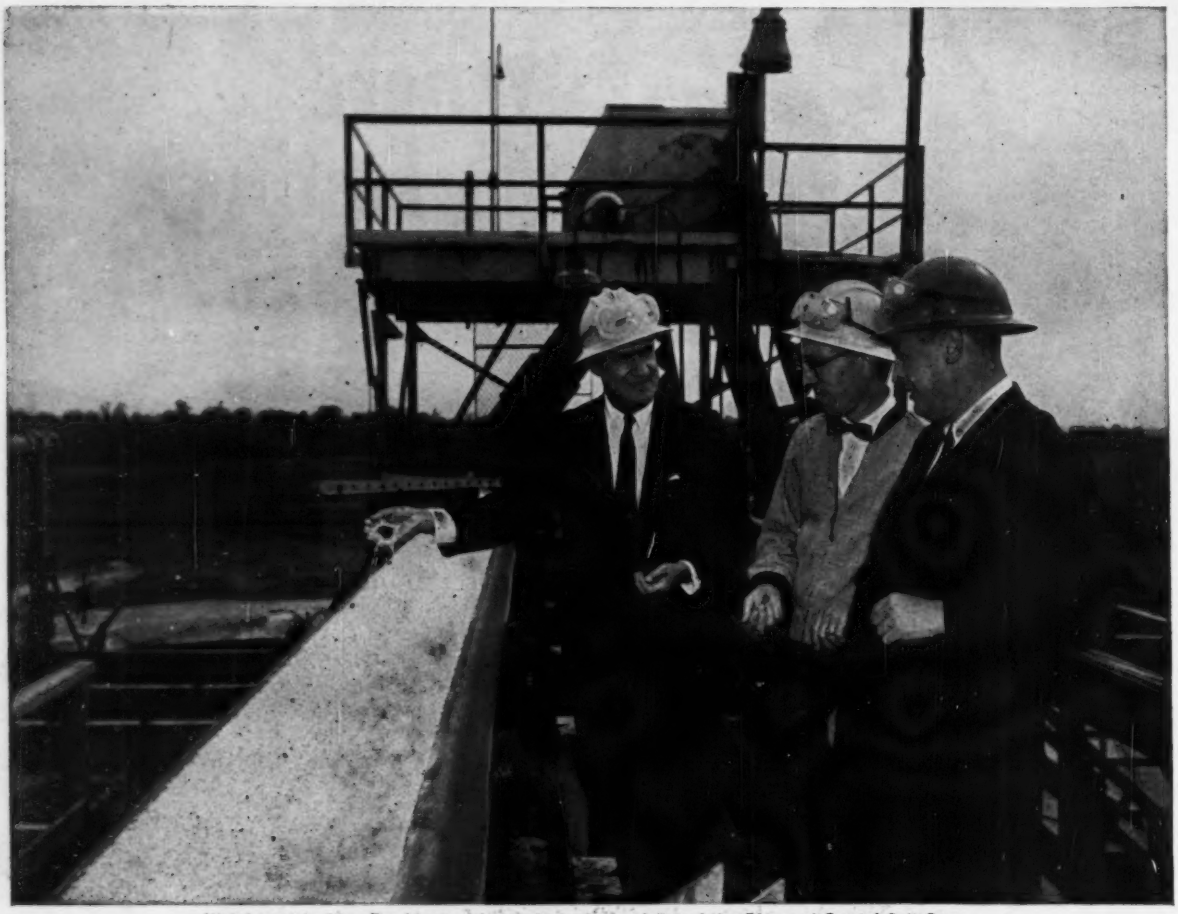
CHASE BAG COMPANY
355 Lexington Avenue · New York 17, N.Y.

** A Chase Bag will make your product a Very Important Package*

MULTIWALLS · TEXTILE · PLASTIC AND LAMINATED BAGS · CONSUMER-SIZE PAPER BAGS AND OTHER PACKAGING MATERIALS

BEHIND THE MAN FROM DIAMOND CRYSTAL...
the chemical salt "know how" of Whit Lonsdale!



Whit Lonsdale, Vice President and chemical salt specialist of the Diamond Crystal Salt Company, looks over a shipment of salt with Chester D. Jones, Director Purchasing for Diamond Alkali, and Maurice Sullenden (center), General Manager of Diamond Alkali's Muscle Shoals plant.

Most important to chemical salt users:—Get the grade of salt they want, in the vast amounts they need, at the lowest possible delivered cost. Salt specialists like Whit Lonsdale, have the experience, the ability, the handling "know how" to combine all these necessary elements into a single package to provide famous "Diamond Crystal Salt Service."

Here at Diamond Alkali's big Muscle Shoals, Alabama plant, highest quality chlorine and rayon grade caustic soda are produced by the modern deNora Mercury Cell process. This calls for a low moisture, fast dissolving salt that saturates completely without channeling. Diamond Crystal supplies this salt in quantity, in a manner that permits Diamond Alkali to operate at peak efficiency. That's what makes Diamond Crystal a leader in salt production for the chemical industry—that's why you should know the Diamond Crystal Salt service story. To get it, call or write—

Diamond Crystal Salt Company

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PLANTS: AKRON, OHIO; JEFFERSON ISLAND, LA.; ST. CLAIR, MICH.
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Snapping Back with a Bang

- **Chemical sales took sharp upswing in past quarter, probably surpassed 1960's record.**
- **Industry profits pulled out of nine-month nosedive, climbing some 20% from preceding quarter—but still lag below '60 levels.**

For chemical companies, it was a rousing second quarter—and the rest of this year now is expected to be just as stimulating.

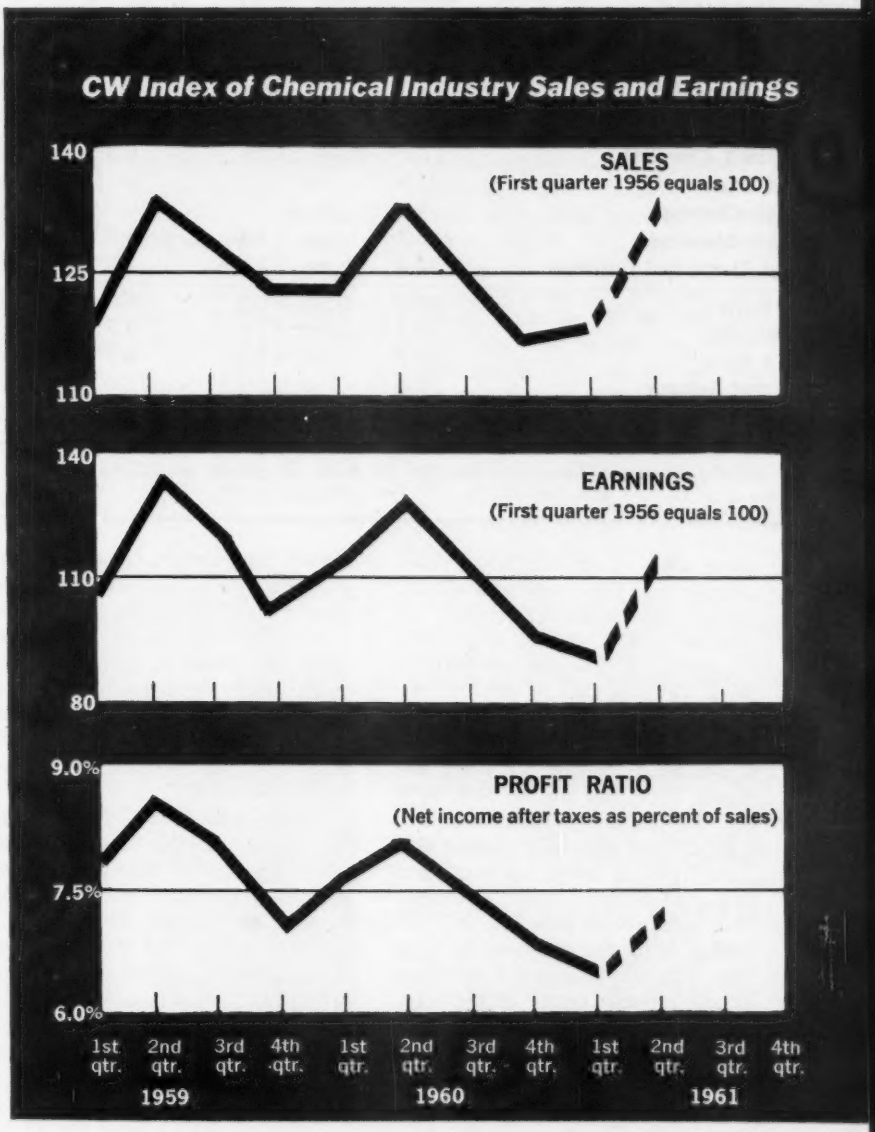
The upturn that germinated for this industry in the first quarter bore fruit in the second period: after having drifted downward for about nine months, chemical sales suddenly snapped back to the level of the year-ago peak (*chart, right*). Sales of chemicals and allied products could exceed $7.5 billion—a new record—for the quarter just ended, and may continue at about that same clip throughout the second half of this year.

Profits pulled out of their nine-month nosedive, but clearly fell short of the levels reached before the 1960-61 recession. This demonstrates that the much-deplored squeeze on profits is not merely the result of low operating rates; with chemical sales at about 100% of last year's peak, net income after taxes is still 10-20% below the year-ago reference point.

Producers of industrial chemicals and synthetic resins are ahead of the rest of the industry in improvement of earnings. At least one of the larger chemical-and-resin producers—Hercules—actually scored a gain in second-quarter earnings; and all reporting companies in this category managed to come reasonably close to their year-ago profitability ratios (*table, p. 14*).

First reports from pharmaceutical companies show mixed results. Some—like Smith Kline and French and Plough, Inc.—show moderate increases in both sales and net income; Baxter Laboratories came up with a 6% rise in sales but a 15% drop in six-month earnings; and for Parke, Davis, the past six months brought sharp declines in both sales and earnings.

That petrochemical producers are thriving is indicated in operating figures from Cosden Petroleum for its fiscal year ended April 30. Sales and other gross income for the 12 months dipped by less than half of 1%, to $82.1 million; but net earnings were a shade higher at nearly $4.8 million—and only because of Cosden's increasing petrochemical activities. President R. L. Tollett estimates that while only



Midyear pattern: surging sales ease—but fail to cure—pinch on profits

	SALES		EARNINGS		PROFIT RATIOS		
	*First Half '61**	*Change from First Half '60*	*First Half '61**	*Change from First Half '60*	*1st Qtr. '61*	*2nd Qtr. '61*	*2nd Qtr. '60*
Abbott Laboratories	62.7	Up 0.8%	5.0	Down 13.1%	10.3%	5.3%	5.0%
Air Reduction	98.6	Down 4.5%	5.7	Down 27.5%	5.8%	5.8%	7.4%
Allied Chemical	379.9	Down 5.3%	25.7	Down 16.9%	5.6%	7.7%	8.0%
American Cyanamid	300.9	Down 1.4%	23.7	Down 16.5%	8.2%	7.6%	8.2%
American Enka(1)	48.1	Up 5.7%	1.8	Up 166.9%	2.7%	4.8%	0.8%
Celanese Corp.(2)	136.5	Down 0.7%	8.5	Down 15.4%	5.7%	6.6%	7.4%
Commercial Solvents	32.6	Down 5.1%	2.8	Up 8.6%	8.2%	9.2%	8.2%
Dow Chemical(2)(3)	820	Up 1.3%	64	Down 23.7%	6.7%	8.4%	10.1%
Du Pont(4)	1,076	Down 1.9%	120 (5)	Down 11.8%	10.8%	11.9%	12.6%
Ferro Corp.	29.8	Down 9.3%	1.05	Down 39.1%	3.0%	4.0%	4.9%
General Aniline(4)	81.0	Up 0.6%	2.9	Down 18.3%	3.4%	3.8%	4.5%
Goodrich, B. F.	370.4	Down 8.3%	15.1	Down 17.1%	3.3%	4.7%	4.5%
Hercules Powder	182.2	Up 9.3%	13.3	Up 0.5%	6.3%	8.2%	9.1%
Heyden Newport	29.8	Down 2.5%	1.4	Down 22.0%	5.0%	4.7%	6.1%
Hooker Chemical(6)	73.0	Down 2.7%	5.7	Down 10.7%	7.5%	8.1%	8.8%
Kaiser Alum. & Chemical	206.4	Down 3.7%	10.6	Down 9.3%	3.7%	6.5%	4.3%
Mallinckrodt Chemical	17.0	Down 10.2%	0.36	Down 43.3%	2.2%	2.0%	3.5%
Metal & Thermit	21.0	Up 7.7%	0.73	Up 15.7%	2.6%	4.1%	3.7%
Michigan Chemical	4.5	Up 16.5%	—0.15%	—	(7)	0.2%	(7)
Monsanto Chemical	465.7	Up 1.1%	34.6	Down 9.8%	7.1%	7.7%	8.3%
National Starch and Chemical	32.8	Up 7.2%	1.9	Up 12.3%	5.1%	6.7%	5.8%
Parke, Davis	90.2	Down 9.0%	9.4	Down 37.7%	12.1%	8.6%	12.2%
Rayonier, Inc.	64.7	Down 7.1%	3.7	Down 36.3%	5.1%	6.4%	9.1%
Rohm & Haas	110.5	Down 4.9%	9.7	Down 20.5%	7.7%	9.8%	10.6%
Texas Gulf Sulphur	29.4	Up 1.0%	6.0	Down 1.4%	20.5%	20.6%	21.3%
Union Carbide	747.5	Down 3.1%	69.4	Down 14.5%	9.3%	9.3%	10.4%

*All dollar figures in millions. (1) For first 24 weeks of calendar year. (2) Figures for latest quarter estimater by CW. (3) For fiscal year ended May 31. (4) Not final figures. (5) Net operating income, estimated by CW. (6) For six months ended May 31. (7) Net loss.

about 4.4% of the company's crude oil input went into petrochemicals, this part of the company's operations accounted for 25% of total net income. Cosden is a 53%-owned subsidiary of W. R. Grace & Co.

Chemical specialties have also been moving in heavy volume. Texize Chemicals (Greenville, S.C.) says six-month sales shot up by 30% to a record $9 million, giving the company a $22,505 net profit as contrasted with a $187,184 net loss in last year's first half. And DuBois Chemicals (Cincinnati) notes a 4.8% sales rise, to $7.05 million, in the first quarter of its fiscal year, with May shipments higher than in any previous month of the company's 41-year history.

The business recovery had roughly similar effects on other branches of the chemical process industries. In rubber, for example, Goodrich came to within 2.8% of matching its second-quarter '60 sales volume, but managed to top its year-ago quarterly earnings by 2.3%. President J. W. Keener anticipates "a rising trend of business activity" for the remainder of this year, and predicts the company's operating results will be better than in the second half of '60.

Crown Zellerbach—a leader in pulp, paper and other forest products—virtually equaled its first-half sales mark of nearly $276 million in '60, though earnings were down 10.3%, to $18.2 million. But the pickup in second-quarter earnings relative to first-quarter performance was 18.7%, despite what the company calls "highly competitive conditions" in principal product lines.

For Libbey-Owens-Ford Glass Co., the April-May-June quarter brought a 33% upturn in earnings, to $9.7 million, from the first-quarter low.

A livelier market for man-made fibers is reflected in second-quarter gains made by such companies as American Enka, Celanese and Du Pont. Board Chairman Philip B. Stull of American Enka said his company's volume of rayon and nylon shipments for the second 12-week period of '61 was substantially ahead of the same period one year ago, and also higher than in the first 12 weeks of this year. "Prices and profit margins, however, caused by the continuance of severe competitive conditions in the industry, have not yet returned to reasonable levels," Stull added.

CHEMICAL WEEK's estimates for Dow Chemical's fiscal year ended last May 31 reflect the acquisition of

Allied Laboratories early this year. This pharmaceutical and veterinary medicine producer has had something of an off-year, with sales down to about $27 million; but this was more than enough to put Dow well into the $800-million/year sales category.

Outlook for the rest of calendar year '61 varies from company to company, but optimism is generally strong. Rayonier President Russell F. Erickson looks for business to continue at high sales levels through the year's end, but points out that prices have dropped on many types of chemical celluloses while manufacturing and distribution costs have been steadily increasing. Chairman Kerby H. Fisk of Allied Chemical expects the usual seasonal dip in third-quarter business, but sees hope that second-half earnings will exceed those of second-half '60 and "approach or exceed" results for this year's first half.

A fuller picture of the second-quarter upturn will come during the next two weeks as other chemical companies bring out their financial figures. But the main import of data already available will probably stand unchanged: that the present profit squeeze is too deeply rooted to be exorcised by even a sharp upswing in sales volume.

India Cuts Red Tape

To speed results from its third five-year plan for industrial development, India has streamlined its procedures for approving new projects.

Instead of sending applicants successively to different agencies responsible for licensing, capital issues, terms of foreign collaboration, etc., all of these activities will be coordinated by one office. A senior officer at the Commerce and Industry Ministry has been assigned this responsibility.

This office has drawn up a list of industries that now have gaps in desired capacity, and in which the Indian government would like to encourage foreign investment. Included under chemicals: plastics, fertilizers, organic chemicals, fine chemicals and intermediates, industrial explosives, industrial gases, agricultural chemicals, dyes, drugs and intermediates.

The government wants to avoid schemes that would involve long-term importing of intermediates, prefers integrated operations.

New Tax Plan May Make It

The House Ways & Means Committee last week tentatively approved a package including—among other things—a tax-benefit incentive for modernization of equipment, some changes on taxing overseas income, and a withholding scheme on dividend and interest payments.

However, the package is a far cry from the varied, complex and much larger bundle of changes the Administration recommended this spring.

The essential part of the bill is the tax credit, which, under the committee-approved version, will give business firms a tax cut amounting to $1.1-1.2 billion.

According to the committee's tabulation, its proposals for offsetting revenue-raising changes amount to approximately $900 million.

On paper, this shows a loss of $200-300 million in revenues—which is acceptable to the Treasury. As of this week, House Ways & Means Committee Chairman Wilbur Mills (D., Ark.) believes prospects are good for House approval this session, and there is a possibility that the Senate will take up and perhaps approve a bill.

The tax credit the committee approved has these major features:

(1) The credit would be applied only to purchases of machinery and equipment, not to the investment in buildings and structures.

WIDE WORLD

Congressman Mills: Plant builders may get a tax incentive after all.

(2) Credit can be taken only on equipment having a useful life of six years of more.

(3) Maximum allowable credit is 50% of a firm's tax bill; the Administration proposed a 30% ceiling.

(4) The 50% maximum would not apply to the first $100,000 of tax liability. (The maximum credit against a tax bill of $150,000 would be $125,000.)

(5) Purchases, up to $50,000, of used or second-hand machinery are eligible for the credit.

The committee rejected or postponed most of the sweeping proposals Kennedy recommended for taxing overseas earnings. On the hotly opposed proposal to tax earnings of foreign subsidiaries as earned, rather than when they are repatriated, the committee approved only one change.

It would require foreign dividends received by a parent company to be "grossed up"—i.e., this income must reflect the amount before payment of the foreign taxes attributed to the dividend. Under present law, the taxpayer takes the foreign tax credit against income after the foreign tax. All further consideration of tightening up on so-called "tax haven" operations is to be postponed until next year.

On dividend and interest withholding, the committee adopted the essentials of the Administration plan, but fixed a withholding rate of 16⅔% instead of the 20% advocated by President Kennedy. Each quarter, companies would mail direct to Internal Revenue Service 16⅔% of the total amount of dividend payments.

Taxpayers, in preparing their own tax returns, would take this into account by adding the withheld amount to their dividend income and then taking credit for this amount as taxes paid on their behalf to the government. However, corporations would not have to keep account of the amounts due from each dividend receiver.

Administration officials and Congressional leaders would like to clear the bill this year, if possible, so that it will not confront them next year along with a big tax reform bill Treasury officials are now putting into order.

Ancon's Hood: President of 50-50 joint venture in methyl chloride.

New Entry: 'Ancon'

Ancon Chemical Corp. will be the name of the methyl chloride joint venture set up by Ansul Chemical Co. and Continental Oil Co. (CW, May 27, p. 24). The new company will immediately start construction of a 60-million-lbs./year plant at Lake Charles, La. Cost: more than $1 million. Scheduled for completion: early '62. The construction contract was awarded to Blaw-Knox Co.

Each partner in the venture owns 50%, has four members on the board of directors. Chairman is E. R. Baker, Continental's general manager of research and development and petrochemicals. President is Ansul's Robert C. Hood.

The methyl chloride will be distributed by Ansul, which already makes it at Marinette, Wis.

Trade sources believe that most of the new plant's output is earmarked for tetramethyl lead plants being built at Beaumont and Freeport, Tex., by Houston Chemical and Nalco Chemical. Ancon also mentions makers of butyl rubber, silicones, methyl cellulose and quaternary ammonium compounds as possible customers.

Other officers of the new company are Walter Miller, of Continental, and William Rinelli, of Ansul, both vice-presidents; J. J. Dordan, of Continental, treasurer; Dudley Miller, secretary; and Edwin Schlutter, of Ansul, comptroller.

New LPG Lineups

New production forecasts and new alignments of producers focus attention on the liquefied petroleum gases (LPG) business.

President E. D. Loughney of British American Oil Co. (Toronto) estimates that Canadian production of LPG (as natural gas liquids) would increase from last year's rate of 20,000 bbls./day to a 12-month average of 45,000 bbls./day this year, and to 86,000 bbls./day by '65. One factor in the problem of how much to pipeline into the northern U.S. is LPG's value as a petrochemical feedstock in both countries (*CW, July 15, p. 24; April 15, p. 107*).

"We recognize that the finding of markets for the by-products of natural gas — namely, gas liquids and sulfur — will require a major effort on the part of the [Canadian petroleum] industry as sales of natural gas increase," Loughney states.

Changing Balance: And new alignments are taking shape in the LPG business, which Union Oil Co. Chairman Reese H. Taylor calls "the fastest-growing segment of the petroleum industry."

Four cases in point:

(1) Diversa Inc. (Dallas, Tex.) has acquired for cash more than 70% interest in Central Butane Co. (Waco, Tex.), whose LPG sales volume is about 11 million gal./year. Central Butane's operations will be consolidated with those of United Petroleum Gas Co. (Minneapolis), a wholly owned Diversa subsidiary.

(2) Union Oil Co. (Los Angeles) has purchased American Liquid Gas Corp. (Los Angeles) and will divide its operations between two new Union subsidiaries—Algas Fuel Supply Co. and American Liquid Gas Engineering and Equipment Co.

(3) Suburban Propane Gas Corp. (Whippany, N.J.) has purchased Frio-Tex Oil and Gas Co. (Corpus Christi, Tex.). Suburban calls itself the nation's largest independent LPG distributor, says the new move makes it the only vertically integrated company in the industry. Frio-Tex will put up a natural gasoline plant (throughput: 20 million cu.ft.) at its Corpus Christi site, will also produce propane and butane there.

Another step in Suburban's plans "to expand vertically within the LPG field and to diversify into other industrial activities" was the recent acquisition of The Stove Works, Inc. (Middletown, Pa.).

(4) Socony Mobil Oil Co. (New York) has proposed acquisition of part of the assets and business of Republic Natural Gas Co. (Dallas, Tex.), producer of LPG and natural gasoline as well as natural gas and oil.

KEY CHANGES

Charles W. Walton to vice-president research, Minnesota Mining & Manufacturing (St. Paul).

Thomas H. Manninen to technical assistant to president of Air Reduction Chemical & Carbide, division of Air Reduction Co. (New York).

John C. MacLeod to vice-president operations, Barrett Division of Allied Chemical (New York).

C. W. Nofsinger to vice-chairman of Western Petrochemicals (Kansas City, Mo.).

Rudolf G. Sonneborn to chairman of board and **William Wishnick** to president and chief executive officer of Sonneborn Chemical & Refining, subsidiary of Witco Chemical (New York).

James McWhirter to vice-president, Pennsalt Chemicals (Philadelphia).

Herbert J. Siegel to chairman and **James J. Rochelis** to president of Baldwin-Montrose Chemical (New York). **Ira Vandewater,** president, and **C. E. Griffith,** vice-president, of R. W. Greeff & Co. to directors of Baldwin-Montrose.

John T. Castles to general manager, Chemical Materials Dept. of General Electric (Pittsfield, Mass.).

John R. Kimberly, chairman of board of Kimberly-Clark Corp., to director of Corning Glass (Corning, N.Y.).

Frank J. Ronan to vice-president marketing, W. R. Grace & Co. (New York).

DIED

R. K. Turner, 59, vice-president of Union Carbide Corp. (New York), at Larchmont, N. Y., July 18.

Borrowing to Build

Four chemical process companies last week borrowed an aggregate of $259 million, much of which will go into '61 construction programs.

(1) Shell Oil Co. (New York) sold $200 million worth of 4⅝% sinking-fund debentures through an underwriting syndicate headed by Morgan Stanley & Co. Shell estimates that its total capital expenditures this year will be up 2.1%, to $290 million, but that capital outlays for its Shell Chemical Co. division will be up more than 140%, to $43.5 million.

(2) SunOlin Chemical Co. borrowed a total of $36 million on two series of secured notes through direct placement with a bank and various institutional investors. SunOlin—joint subsidiary of Olin Mathieson Chemical Corp. (New York) and Sun Oil Co. (Philadelphia)—will use most of the proceeds in financing construction projects already under way. Among them: ethylene and ethylene oxide units, a hydrogen and carbon monoxide plant, and a pipeline to carry those gaseous products from the plant site at Claymont, Del., to contract customers in New Jersey. The company started up its urea plant at Claymont last October.

(3) Atlas Chemical Industries (Wilmington, Del.)—formerly known as Atlas Powder Co.—raised $18 million in two moves, each of which was handled by F. Eberstadt & Co. Atlas Chemical sold $9 million worth of 4⅞% notes to various institutional investors; and entered into agreements for a total of $9 million in bank credits. The company is planning to build a $17-million glycerin plant at its Atlas Point site near Wilmington, and its 50%-owned Solar Nitrogen Chemicals has been expanding ammonia and urea capacity (*CW, April 1, p. 22*).

(4) Southern Nitrogen Co. (Savannah, Ga.) completed arrangements with Mutual Life Insurance Co. of New York for a $5-million loan to finance additional production and storage facilities at Savannah and Tampa, Fla., and at one or more locations yet to be selected in North Carolina. The loan will be secured by 6% first-mortgage bonds, and Mutual will receive warrants to buy 37,500 shares of Southern Nitrogen common stock at $20/share up to Oct. 1, '71.

WIDE WORLD

Canada's Fleming: The Senate didn't cooperate, may be in for a 'reform.'

No Canadian Tariff Boost

A bill (C72) that would have put many more Canadian chemical imports into higher tariff brackets is now dead, will not be brought up again until the next time Parliament meets. This may be late fall—sooner if an election is called this summer. The government has threatened to call an election on the issue of Senate reform—given new importance by the killing of the tariff-revision bill.

The bill would have clarified the definition of goods of a "class or kind made in Canada." The clarification — called for by Minister of Finance Donald M. Fleming last December — would have put more products into this classification. Result would have been a boost in tariff rates—in some cases from zero to as much as 15% "British-preferential," 20% "most-favored-nation." Goods would become so classified if:

"a. In the case of goods other than goods custom-made to specifications, goods of approximately the same class or kind are made . . . in Canada. . . .

"b. In the case of goods custom-made to specifications, adequate facilities exist in Canada for economic production within a reasonable time."

The Senate, dominated by Western free-trading liberals, objected to the bill's denial of the right of appeal of the Minister's decisions regarding: (1) Canadian production (must be 10% of consumption) of a product in question; (2) existence of adequate facilities in Canada for economic production of custom-made goods.

The Senate tacked on an amendment granting the right of appeal, and sent the bill back to the lower house. The government then threatened to call an election on Senate reform if the amendment were not removed. The Senate stood firm and the bill died.

Canadian manufacturers, including the chemical industry, generally favor the bill. Producers of industrial detergents and plasticizers, among others, have spoken enthusiastically of it. Makers of surface-active agents say that imports have taken 55% of the industrial detergents market, despite the availability of a complete Canadian-made line. But imports have been coming in under low tariff rates because in many cases the products have different tradenames from their Canadian counterparts, are therefore classified differently.

Similarly, makers of plasticizers complain that competing products are coming in duty-free because they are not chemically identical with Canadian products.

Profits at Last

United Technical Industries looks to the last quarter of this year as the turning point in its long-researched project to recover beryllium metal from the Spors and Topaz mountains of Utah (*CW, July 1, p. 35*).

Speaking last week before the New York Society of Security Analysts, UTI President Vincent A. Duff said the company's joint venture with Beryllium Corp. (Reading, Pa.) should earn 20¢/share ($200,000) in the final quarter, with "substantially more" in store next year. Research work has been in progress for eight years.

The Delta, Utah, plant is now starting up; beryllium oxide output is expected to hit 30,000 lbs./month by September. A second unit, with capacity of 150-200,000 lbs./month, is due onstream next year.

Two possibilities that the company is exploring: (1) aluminum chemicals from the alumina by-product of beryl refining; (2) beryllium as a solid-propellant component.

national roundup

Rounding out the week's domestic news.

Companies

Universal Minerals & Metals (New York) has acquired a two-thirds interest in Whitaker Metals (Kansas City, Mo.) by acquisition of 560,000 shares of newly issued common stock. Whitaker Metals produces chemically refined copper powder; the acquisition will allow Universal to enter large-scale commercial fabrication here and abroad. Universal plans to double Whitaker's present capacity.

Synchem Corp. (Camden, N.J.) has been established by R. M. Hollingshead Corp. and M. Sittenfield & Associates to research, develop and market chemical biocides and other chemical specialties based on quaternary ammonium compounds. Products will be aimed at industrial and household disinfecting, hygiene and antifungal applications.

St. Joseph Lead Co. (New York) has sold its interest in Brunswick Mining & Smelting Corp. to East Coast Smelting & Chemical Co. Ltd., a Canadian investment group, for $10.5 million. The new owners are considering adding fertilizer production to the company's mining activities.

Stauffer Chemical (New York) has incorporated its Nyotex Division into its Industrial Chemicals Division. Nyotex produces fluorine chemicals and hydrofluoric acid at its Houston, Tex., plant.

Expansion

Sodium Chlorate: Pittsburgh Plate Glass Co.'s chemical division has started construction of a 15,000-tons/-year sodium chlorate plant at Lake Charles, La. The multimillion-dollar unit is due onstream in Sept. '62.

Polyester Resins: Verona Chemical Corp. (Union, N.J.)—an affiliate of Germany's Farbenfabriken Bayer —has installed facilities for producing Roskydal-brand polyesters at its Newark, N.J., plant. Initial capacity will be close to 1 million lbs./year. Naftone, Inc. (New York) will receive the entire output for use in making resin coatings for wood, masonite, metal and other surfaces.

Titanium Dioxide: Du Pont plans to increase by 30% the 45,000-tons/year capacity of its titanium dioxide pigment facilities at New Johnsonville, Tenn., during the next 12 months.

Oxygen, Nitrogen, Argon: National Cylinder Gas Division of Chemetron Corp. (Chicago) will build an on-site air-separation plant adjacent to Texas Instruments' semiconductor plant in Dallas, Tex. American Air Liquide (New York) will supply equipment for the $1-million plant. Initial capacity: 120 tons/day of oxygen, nitrogen and argon. The plant will supply Texas Instruments with large quantities of high-purity nitrogen and other gases for semiconductor production. It will sell the rest in the Southwest market.

Aluminum: Harvey Aluminum (Torrance, Calif.) is teaming with the provincial government of New Brunswick, Can., to study the feasibility of establishing an integrated aluminum plant there. Harvey is also considering projects in the Caribbean and Pacific Northwest (*CW, July 22, p. 27*).

foreign roundup

Rounding out the week's international news.

Plastics/United Kingdom: Stockholders representing more than 90% of the shares of O.&M. Kleemann, Ltd., British plastics processing and marketing company, have agreed to sell their shares to Mobil Holdings, Ltd., an affiliate of Socony Mobil. Cost to Mobil: about $20 million.

DMT/Netherlands: Amoco International, S. A., an affiliate of Amoco Chemicals (Chicago), has set up a joint venture with Algemeene Kunstzijde Unie N.V. to manufacture dimethyl terephthalate in the Netherlands. A plant will be built by '63 at Delfzikl, in the north of the country, where salt, ammonia, and natural gas are plentiful. The new company will be named N. V. Petrochemie AKU-AMOCO.

Detergents/Libya: The first chemical plant in oil-rich Libya will be a $300,000 detergents plant near Tripoli, due for completion next summer. The Libyan firm Societa Industriale Libica has signed an agreement with Lurgi Gesellschaft (Frankfurt, West Germany) for construction and initial operation of the plant.

Argon/India: Substantial amounts of argon gas will be made available as a by-product at the $50-million fertilizer plant now being built at Trombay Island, near Bombay. The state-owned plant will be in operation by early '64. The argon will be used mainly for welding, other industrial purposes.

Chemicals/Syria: The Syrian chemical industry, second only to textiles in new starts last year, tallied 83 new projects. Total value: about $19.5 million.

Washington
Newsletter

CHEMICAL WEEK
July 29, 1961

A huge increase in the saline water conversion program is planned by the Kennedy Administration over the next 10 years—if Congress will go along. Last week, the Interior Dept.'s Office of Saline Water asked Congress, in effect, for an open-end authorization to spend all the money it deems warranted and necessary. When the House Interior Committee wouldn't accept this, Director Frederick MacGowan of the Office of Saline Water responded with four-year cost estimates.

MacGowan suggested a $178.4-million program for the next four years. It breaks down into $37.5 million for research and development; $82.6 million for 13 new demonstration plants; $25 million in loans for construction of 10 conversion plants, and $33.3 million in grants to municipalities for construction of 31 other plants. The program so far never has exceeded $3 million a year.

MacGowan's program projects to more than $400 million over a 10-year period. But neither he nor Interior Dept. Secretary Stewart Udall is willing to be confined to that, or any other figure. The feeling is that much more money may be needed if and when new advances are achieved in water conversion techniques. In the past nine years the cost of converting sea water into fresh water has been reduced from $5 to about $1/1,000 gal. The Administration is aiming at a maximum of 40¢.

•

Bills to ease the tax burden on Du Pont stockholders that will arise from court-ordered divestiture of 63 million shares of General Motors stock seem to have little chance in Congress. Reason: the Administration has failed to support the bills. Treasury comment to the House Ways and Means Committee was strictly neutral. But Attorney General Robert F. Kennedy was more pointed; he could see no antitrust considerations that would justify a change in tax laws. He also could see no reason for the Treasury to lose money through an antitrust case.

Kennedy had only one consoling thought for Du Pont stockholders. He said the Justice Dept. would be glad to study any proposal that might defer tax liability on a forced stock distribution. The bills under consideration generally would permit shareholders to treat the transaction as a capital gain instead of ordinary income. In the Du Pont case the Treasury would lose close to $1 billion through the change.

•

Legal action against the practice of "administered prices" is contemplated by the Federal Trade Commission. This is a favorite subject of Chairman Paul Rand Dixon, former chief counsel of Sen. Estes Kefauver's (D.-Tenn.) Antitrust Subcommittee. Right now, Dixon is deeply involved in an internal reorganization of FTC but plans to turn his attention to administered prices within a month or so.

What Dixon's aides have in mind is legal use of Section 5 of the FTC act, which declares unlawful "unfair methods of competition in com-

merce and unfair or deceptive acts or practices in commerce. . . ." With such broad language, they feel that rigid—or noncompetitive—price structures might be declared illegal by the courts. As an added advantage, FTC attorneys believe they would not have to prove conspiracy—as they must in Sherman antitrust law cases. Thinking on the entire subject is still in the preliminary stage, however.

•

Economic impact of the expanded defense program, forced on the Kennedy Administration by the Berlin crisis, will be a long time in coming. Officials studying the problem have come up with one preliminary conclusion: there is no present need for industrial mobilization controls similar to Korean-type priorities and allocations. One official says, "The economy has a long way to go before we are in a stringent enough situation where supply controls are needed to meet military requirements."

Short-range, the only materials in which a pinch might be felt in the commercial market is high-temperature nickel alloys. Prime and subcontractors of the Defense Dept., Atomic Energy Commission and National Aeronautics and Space Administration now consume about 20% of total shipments, and this is likely to go up. In other areas—steel, copper, aluminum and nickel—government contractors use only from 1% to 5% of supplies. In other words, there is room for expanded use without any pinch on commercial markets.

Present Administration thinking is to add $2-3 billion to the defense budget for a long-range buildup of America's military strength.

•

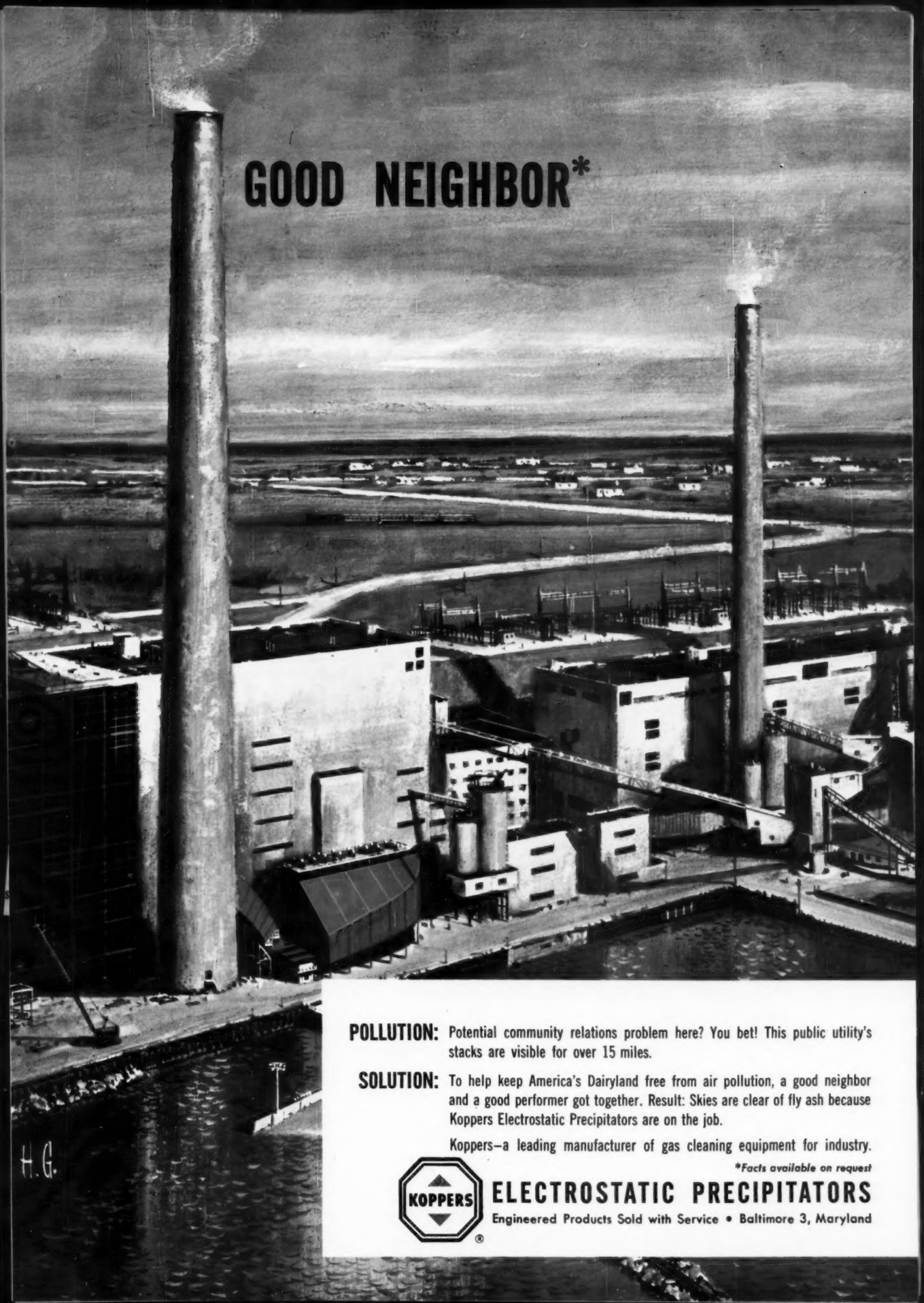
Electric generators for the large Hanford plutonium reactor are virtually assured by last week's Senate action on AEC's fiscal '62 construction bill. The Senate approved the $95-million item in the $365-million measure by a 54 to 36 vote. Earlier, the House had cut the generators out of the measure. Opponents, led by Rep. Craig Hosmer (R.-Calif.), still plan a battle in conference committee or on the House floor. But they probably will be overwhelmed by proponents. The measure also contains $114 million for construction of the Stanford linear electron accelerator.

•

Praise for the new federal water pollution control act comes from the Manufacturing Chemists' Assn. MCA says the law (*Washington Newsletter, July 22*) assures "the nation of an adequate safe water supply" and maintains the "primacy of local responsibility in providing effective pollution control." President Kennedy signed the program into law last week.

•

First major revision of drinking water standards since '46 are disclosed by Surgeon General Luther L. Terry. For the first time, limits are established for certain chemical pollutants. The standards, which apply to drinking water on interstate trains, planes, buses and ships, may be obtained from the Dept. of Health, Education and Welfare in Washington.



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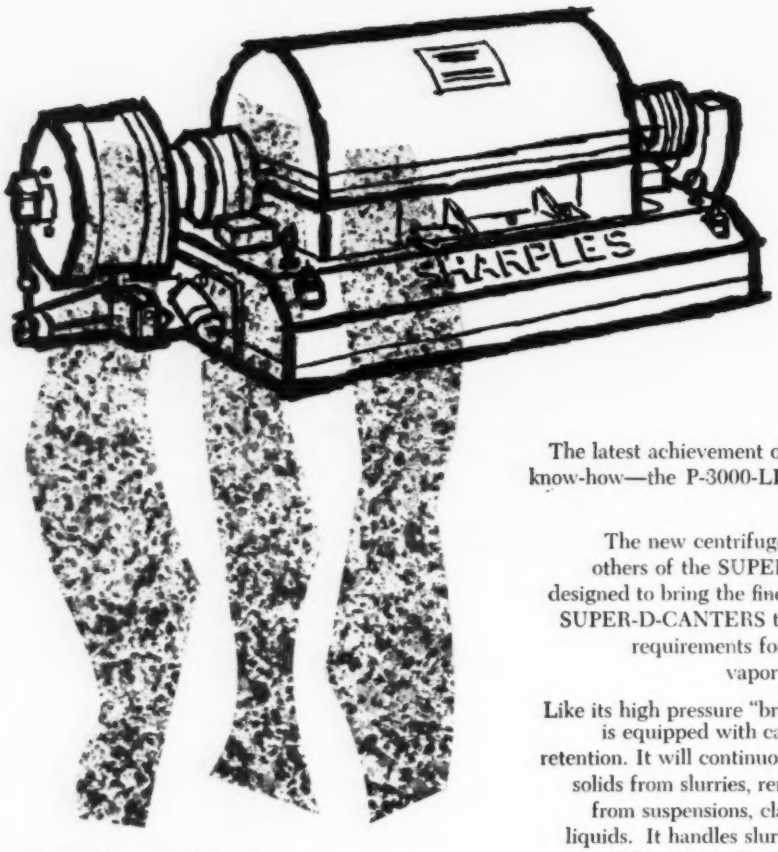

The latest achievement of Sharples engineering know-how—the P-3000-LP SUPER-D-CANTER —is now available.

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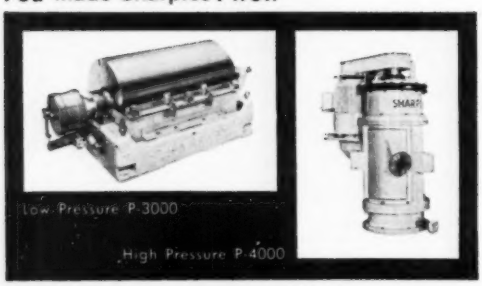

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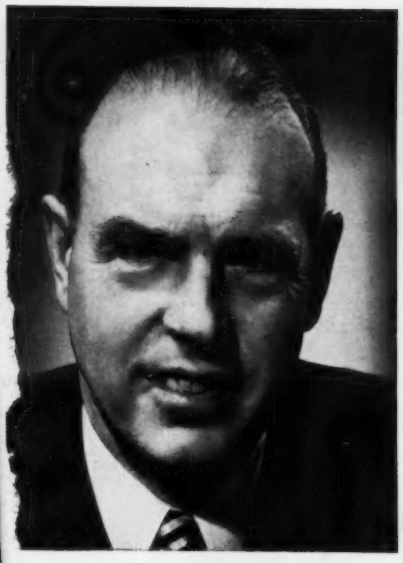

Dominion Tar's Hall: $1 million in tax savings during the first year.

Shawinigan's Rogers: New law will be beneficial, but not outstandingly so.

Ayerst, McKenna & Harrison's Gaudry: Need much stronger measures.

Tax Boost for Canadian Research

Firms doing research in Canada will soon be able to take advantage of new Canadian tax legislation aimed at spurring research expenditures. Bill C-120, assured of passage by Parliament, includes provisions for faster write-offs of capital expenses for research and liberalized deductions, as recommended by Finance Minister Donald Fleming in his recent budget message.

In contrast, on the U.S. side of the border there is apparently no concerted effort to seek further special research tax incentives in Congress. U.S. companies, asked by CHEMICAL WEEK about their interest in such reforms, either had no comment or made only general statements about the need for general tax and depreciation reform.

Canadian chemical processors are generally pleased with the new measures, but are still interested in even broader incentives and in direct government subsidy. A number of Canadian subsidiaries of U.S. firms have for some time conducted independent research programs, are now likely to consider expanding them.

Canadian Incentives: Most important of three new incentives for research in Canada is a provision allowing capital expenditures for research facilities (e.g., buildings, equipment) to be fully deducted in the year in which they occur. In the past, such write-offs have had to be spread over three years. Under the new measure, however, a research program that amounts to more than 5% of a company's taxable income must be approved by Canada's National Research Council before it can qualify for the one-year write-off.

Another provision is that current expenditures for "scientific" research are fully deductible in any amount. Under the old law, application for deduction of such expenditures exceeding 5% of taxable income had to be filed with the Dept. of National Revenue and approved by NRC. (This limitation did not apply to "product" research.) While no such applications are known to have been refused, they have caused some red tape and delay, and have involved continued NRC scrutiny of some companies' programs.

A third incentive: payments to a nonprofit corporation constituted exclusively for carrying out scientific research in Canada are fully deductible. A paragraph in the old law allowed such deductions if made to an "approved organization." However, several uranium producers that made large contributions to set up the Uranium Research Foundation last year found that their contributions were not regarded by the Dept. of National Revenue as a business expense. The new provision is designed to avoid such situations.

Management Reaction: Canadian research executives regard the new amendments to the law as steps in the right direction, but some—especially those in the large firms—consider the steps too small to be of much practical meaning for them. Firmly in favor of the changes is Dominion Tar & Chemical's president, W. N. Hall, who is also president of the Chemical Institute of Canada, a chief backer of the proposals (*CW, March 25, p. 58*).

Speaking for CIC, Hall says that making contributions to research institutes deductible will encourage small companies, particularly, to spend more on research. "The same measure should also encourage the setting up of more interindustry research institutes," he adds.

Dominion Tar will be an early beneficiary of the new provisions. It is planning to build a new research cen-

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ter jointly with three other companies (Hinde & Dauch Paper Co., Ltd., Howard Smith Paper Mills, Ltd., and St. Lawrence Corp. Ltd.). Says Hall, "The operation will benefit greatly from the provision that the capital investment may be claimed for depreciation in the first year of operation. While this makes no long-term change in costs, it does save taxes in the early years and in our case will result in a reduction of taxes in the first year of about $1 million. This money will be available immediately for new capital investment."

Also favoring the changes, but less enthusiastically, is F. K. Rogers, director of development for Shawinigan Chemicals Ltd. (Montreal). "The overall effect of liberalization of the tax law should be beneficial, but not outstandingly so," he says, noting that the only provision previously unavailable is the one-year write-off.

Such changes are too weak to be truly effective, says Roger Gaudry, research director of Ayerst, McKenna & Harrison (Montreal). While acknowledging the good intentions of the legislation, he says it will have no "immediate effect on our company's plans." The new changes, he adds, still do not "create a real incentive for prosecuting basic research in Canada." He asks for measures aimed at keeping scientific talent from leaving the country. "Such measures," he believes, "would have to go far beyond the present small tax concessions, and involve some kind of government subsidization."

Impact in U.S.: The U.S. Bureau of Internal Revenue, the Manufacturing Chemists' Assn. and a number of U.S. firms tell CHEMICAL WEEK that no tax reforms specifically designed to aid research and development are under way in this country. But the Administration is moving in that direction: President Kennedy's tax credit plan and hoped-for changes in the depreciation schedules (*CW, March 25, p. 111*) would cover all aspects of business spending, including R&D.

MCA's reaction to the Administration's tax credit plan is relatively cool. In a letter to the chairman of the House Committee on Ways and Means, MCA said: "In some instances, the proposed credit could be helpful as a stop-gap measure but, in our opinion, over-all depreciation re-

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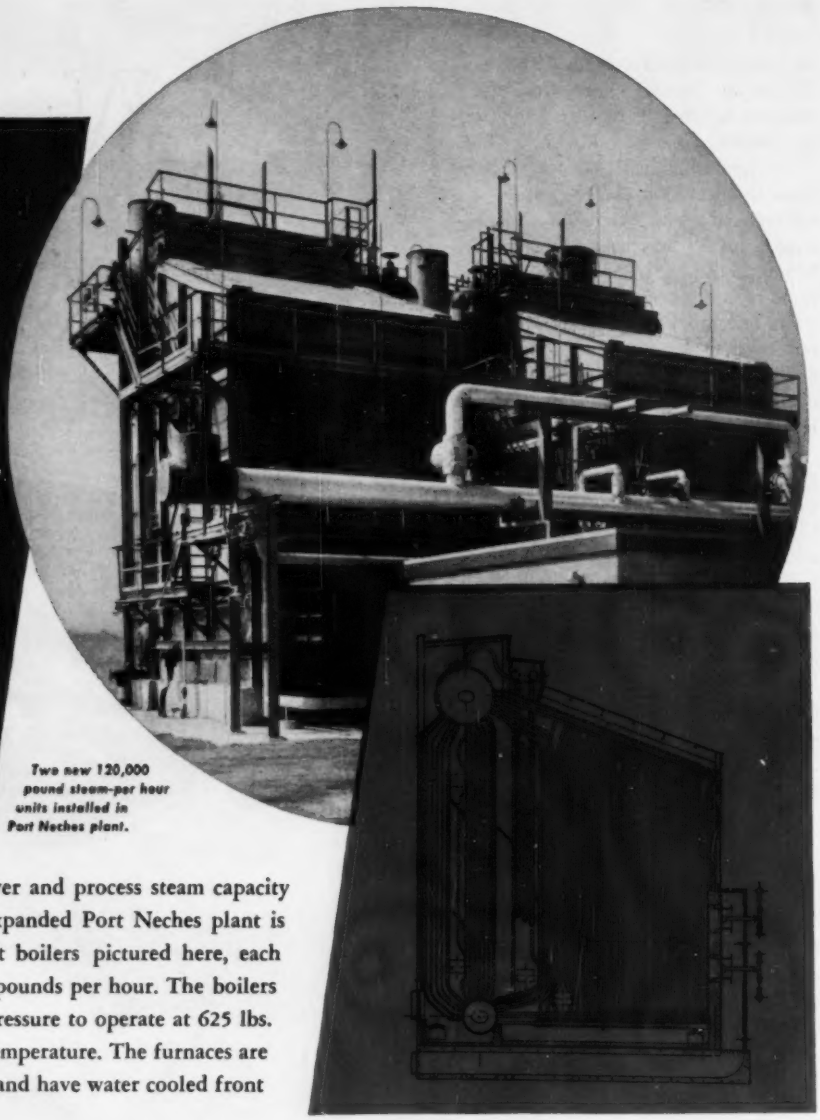

Two new 120,000 pound steam-per hour units installed in Port Neches plant.

The needed additional power and process steam capacity for Jefferson Chemical's expanded Port Neches plant is furnished by the two Vogt boilers pictured here, each with a capacity of 120,000 pounds per hour. The boilers are designed for 675 lbs. pressure to operate at 625 lbs. pressure and 769°F. total temperature. The furnaces are equipped with gas burners and have water cooled front and side walls.

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form is badly needed."

Nevertheless, new incentives for research in Canada could affect U.S. operations in various ways. For instance, Canadian subsidiaries may be in a position to assume more independent research projects. Also, U.S. firms that import researchers from Canada may gradually find this harder to do as job opportunities build up in Canadian labs.

Automatic Camera

A fully automatic microphotographic camera, claimed to be the first that fits any microscope and has both detail and field-integrating exposure mechanisms, has been developed by Ernest Leitz GmbH. (Wetzlar, West Germany).

The new camera, called the Leitz Orthomat, can be operated by foot pedal, has diverse problem-solving features: the film magazine can be changed at any time, place or interval; exposures on color film can be changed to black and white and vice-versa in two seconds; it is a 35-mm. camera with interchangeable casettes to hold any type of film desired; and it takes 36 pictures with a range of exposure time from one-half hour down to 0.01 second.

The camera uses a light-sensitive photocell, a photo-multiplier tube designed by Radio Corp. of America (New York). The tube produces a current from available light, charging a capacitor to a predetermined voltage. A gas discharge tube then starts the discharge, operating a relay. Then the electrical vibration-free shutter opens and closes, ending the exposure, and the film moves up a frame.

EXPANSION

• Construction of General Electric's new, $1.5-million, 39,000-sq.ft. computer laboratory has begun; occupancy is scheduled for early next year. The laboratory is at the Internation Science Foundation complex at Sunnyvale, Calif. Work will be devoted to advanced computer technology, including circuits, logic, character reading, configurations, mechanisms and information theory.

• Vladimir Dvorkovitz, former research director of Diversey Corp. (Chicago) and former president of Jensen-Salsbery Laboratories (subsidiary

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of Richardson-Merrell, Inc.), is setting up a new consulting organization, Dr. Dvorkovitz & Associates (Kansas City, Mo.). The firm will specialize in research and development administration.

• Astropower Inc., a subsidiary of Douglas Aircraft Co., will build a 40,000-sq.ft. research and development center at Costa Mesa, Calif. Scheduled opening: May '62.

• Plans for building an atomic research facility at Albany, Ore., to study minerals and mineral fuels have been made by the Bureau of Mines. The new facility will be completed within a year, will house 100,000 curies of cobalt-60 to be used in determining the effects of gamma radiation on the properties of coal, petroleum, metallic and other minerals.

• A new firm, European Research & Development Corp. filed a charter of incorporation in Dover, Del.

• Another new company incorporated in Dover, Del., is Micro-Biological Laboratories, Inc. It has an authorized capital stock of $1 million.

• Oregon Research Associates, Inc., a nonprofit corporation, is being formed to expand research activity in Oregon. George Gleeson, dean of the Oregon State University School of Engineering, is president.

PRODUCTS

Isothiocyanate: Fallek Products Co., Inc. (New York), is now supplying commercial quantities of phenyl isothiocyanate.

•

Aleuritic Acid: Through the cooperative efforts of William Zinsser & Co., Inc. (New York), and Angelo Bros., Ltd. (Calcutta, India), aleuritic acid is now available in commercial quantities (until now the acid was obtainable only in lab quantities).

•

Nylon-Base Plastic: A new nylon-base reinforced plastic, light in weight and with low thermal conductivity, has been introduced by Advanced Materials Division of Taylor Fibre Co. (Norristown, Pa.). Called Tayloron PN, the material is made from nylon fabric impregnated with a proprietary high-temperature phenolic resin. It was developed for rocket applications, may also be used for components where temperatures exceed 4000 F for a short time.

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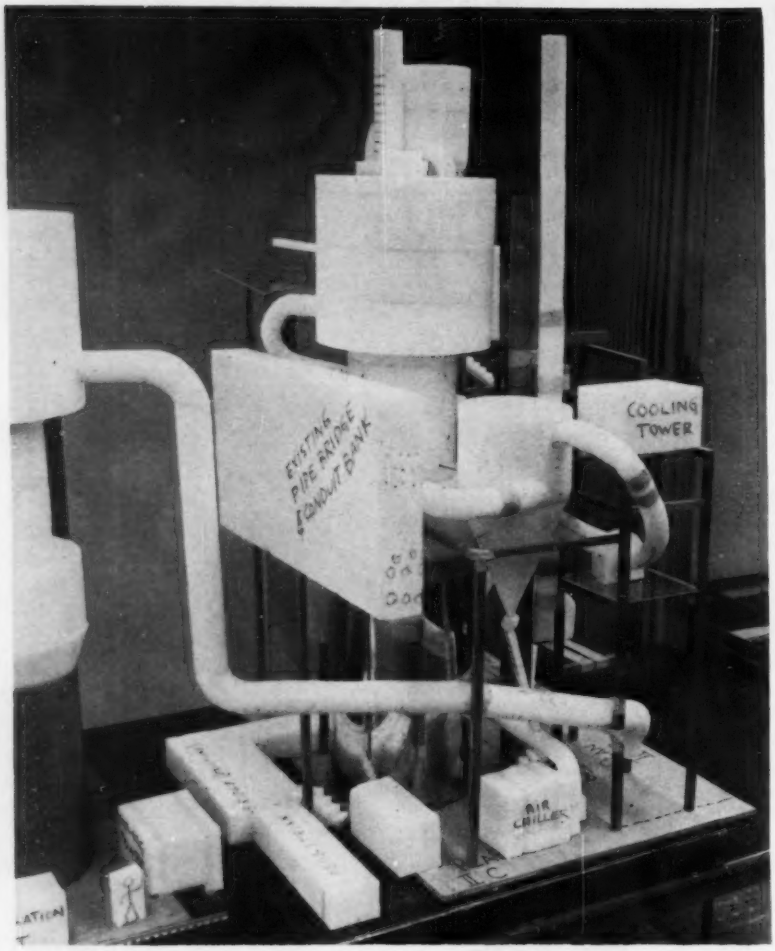

Preliminary arrangement model shows potential preassemblies.

Pushing Prefab Construction

The picture above shows preassembled components in a model of a Procter & Gamble plant currently under construction. It's the latest in design-construction techniques. Benefits: reduced construction costs and savings in materials.

The pipe-rack block shown in the model illustrates the key to the method: emphasis on physical arrangement as well as the process order. Thus, complete sections of processing equipment are isolated according to physical arrangement for preassembly and construction convenience. Three assumptions are made:

(1) A new project must be assembled in a rough model as soon as the process design is set. On this rough model, each small block of work is then separated and analyzed in detail.

(2) Alternate arrangements, based on layout, should be searched out to determine which is least costly.

(3) The cheapest method, when finally selected, is spelled out in instructions to drafting design supervisors and construction foremen.

Physical Before Flow: Although models are now "old hat" to the construction industry, most firms cling to the idea that the function of models is to communicate design details on modern plants that have become too complicated to visualize through conventional engineering drawings. Usually, they withhold model work until the engineering flow diagrams have been completed and the basic plant layout has been fixed in plot-plan drawings.

But this order of work often harnesses planning engineers to an arrangement by which it is almost impossible to design for prefabrication. The flow diagrams must follow the process sequence or become illegible in a tangle of lines. And a plant layout that is based on a study from flow diagrams consequently neglects the benefits that can be gleaned from a study in three dimensions. Usually, such layouts assume the conventional "in line" arrangement (tanks, towers and heat exchangers lined up along a pump bay) and proceed to the most orderly grouping.

The alternative is to begin the model designs as soon as the process engineers have established the size and number of major pieces of equipment.

With this system, the planning engineer can design the plant in space, as the process and mechanical engineers complete their work. To do this, P&G uses three types of models instead of the conventional one: the plot-plan model, the preliminary equipment arrangement model (*shown in the picture*) and the production engineering model, in that order.

Costing Construction: This moves the cost engineer into a new field. Conventionally, cost estimates are figured at minimum operating cost, on the basis of planned layout period. Additional heat exchanger surface, extra numbers of trays in distillation towers, etc., are priced and their supplemental cost is balanced against decreased utilities consumption to select a point at which total operating costs plus installation costs bring an overall minimum. These estimates are generally based on graphs that assume the additional equipment will be installed at minimum price.

Not so with comparative layout studies. These are based on fixed costs. Planning engineers must decide if it is cheaper to extend a platform or to build a separate foundation for a tank, if it is less expensive to group a large cooling water line with other piping in an overhead pipe rack or to run it underground. Making such comparisons involves detailed studies

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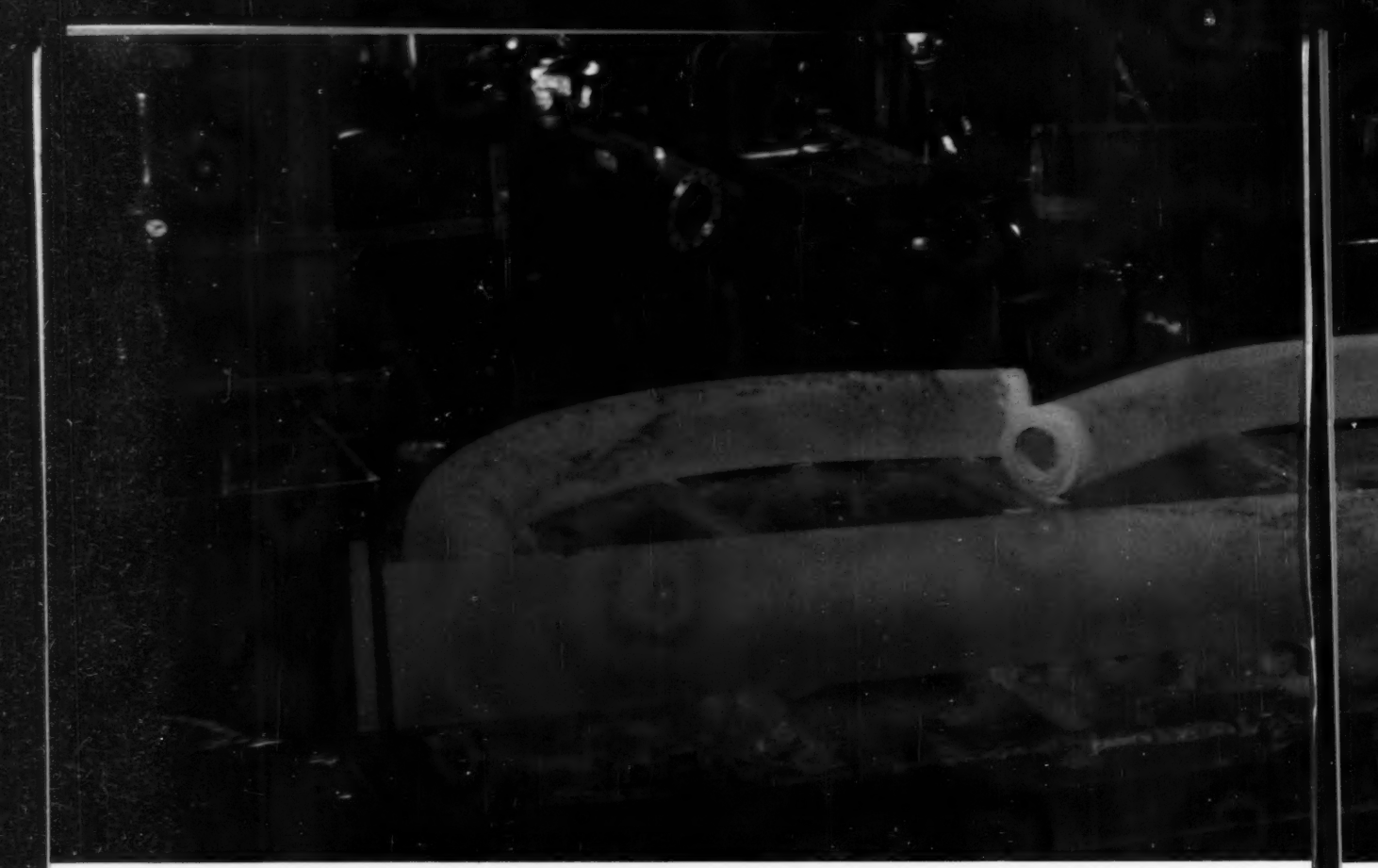

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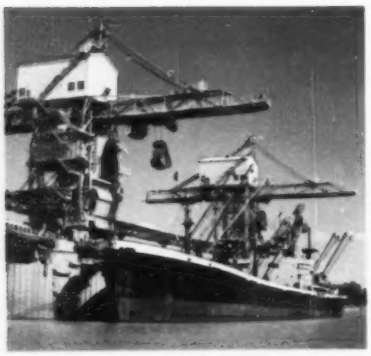

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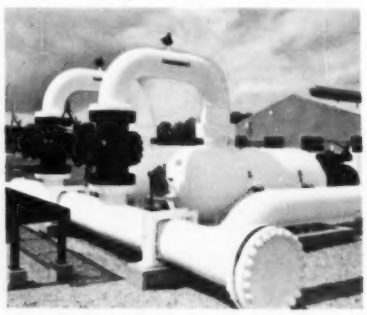

High pressure piping being removed from heat treating furnace in Dravo's modern pipe fabrication plant.

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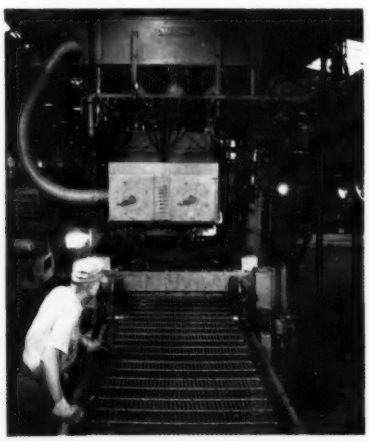

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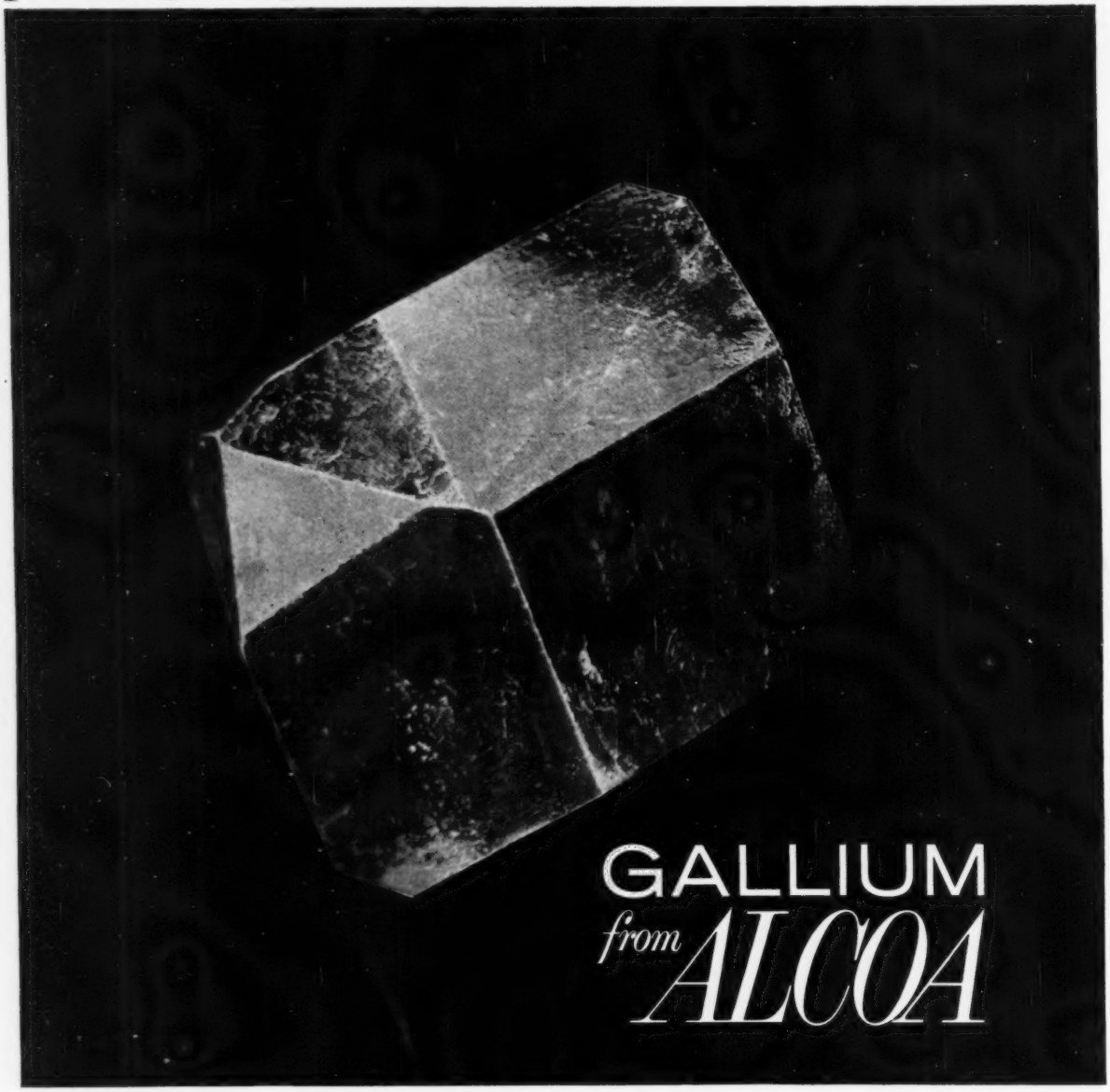

A curious metal is gallium. It melts in your hand, but doesn't boil until 1,983°C. Like water, but unlike most elements, it expands when solidified. Gallium exists in nature, particularly in aluminous ores of the bauxite type. But because of low concentration, it is not economical to process these ores for gallium content alone. Discovered in 1875, this rare metal only recently has shown commercial promise.

Gallium is extremely anisotropic. The variation in electrical resistivity is thought to be greater than for any other known metal. Gallium is widely used in semiconductor devices such as tunnel diodes, high-speed switches and microwave diodes. Gallium alloys readily with most metals, which leads to applications as cathodes in specialized vapor-arc lamps, in dental alloys, as low-resistance contact electrodes.

Gallium is used as a sealant for glass joints in laboratory equipment, particularly mass spectrometers and vacuum equipment. It shows promise as a heat transfer medium in nuclear reactors. It is added in small amounts to certain selenium rectifiers because it emits electrons at fairly low temperatures. It is being evaluated as thermionic valve cathodes for the same reason.

Today Alcoa produces three grades: 99.99 per cent pure, 99.999 per cent pure and 99.9999 per cent pure (Ga-4, Ga-5, Ga-6)—probably the purest metal ever produced by man. Alcoa's spectrographic and electronic techniques are the most rigorous and highly developed in the industry.

Are you interested in gallium applications—tried or untried? Our research and development people are available for discussion. Please write Aluminum Company of America, 706-G Alcoa Building, Pittsburgh 19, Pa.

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of foundations, structures, fabrication at the site, etc. More important, this requires experience:

This is why P&G has expanded its model program to include preliminary designs. It has found that knowledge gained from daily experience must be utilized in routine manner, that most of the ideas are too complicated to allow analysis of each alternative through elaborate designs.

Actually, the ideas come from the construction superintendent, his craft foreman, or the mechanics themselves. The firm keeps a "methods man" on the spot to round up these ideas, and to put them into effect where they can be seen—on the preliminary arrangement model.

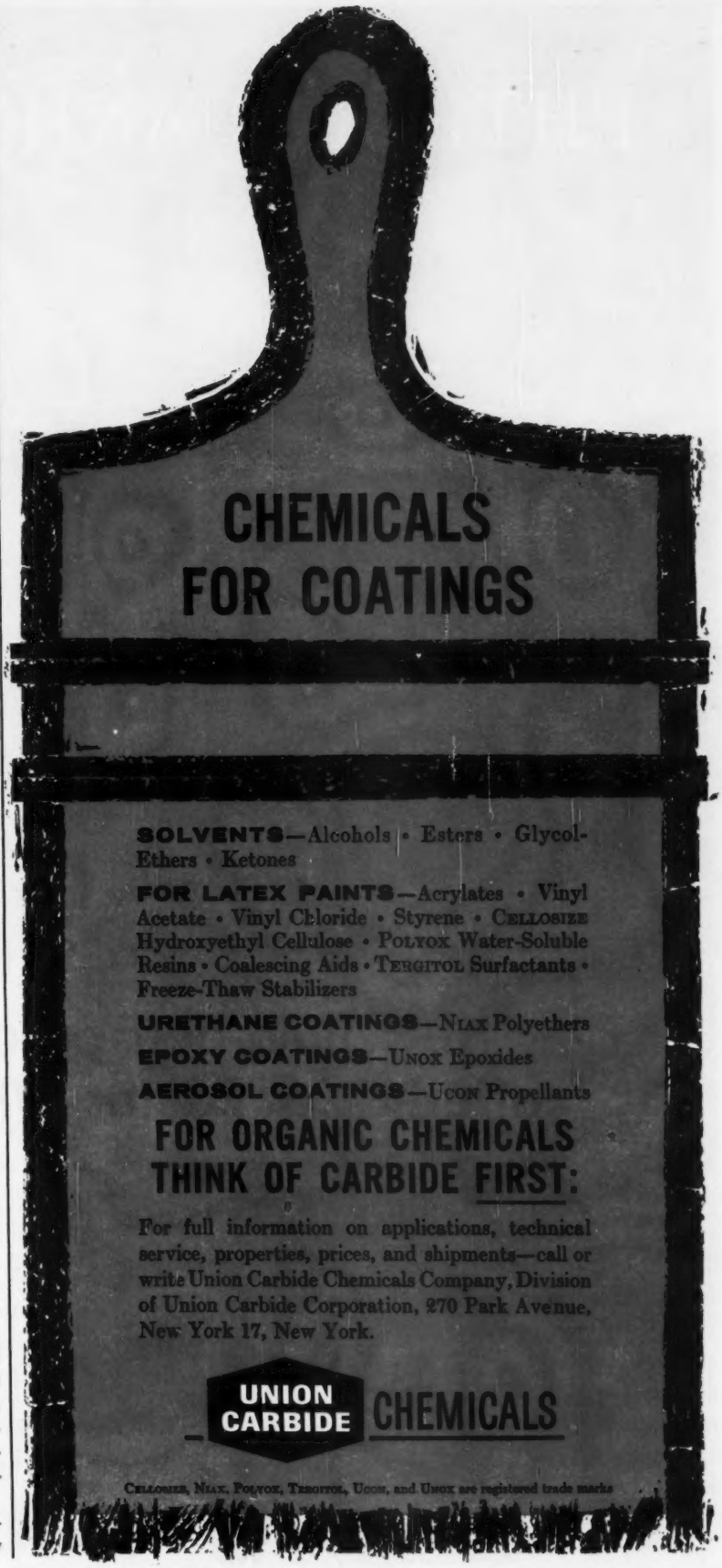
Spelling Out Savings: When the best arrangement has been worked out on the preliminary equipment arrangement model, it has to be spelled out in detail to the design engineers who develop the details of individual pipe runs, weld locations, valve locations, etc. Since the preassembly groupings have been made with respect to the most economical physical layout as well as the process flow sequence, they are not always apparent from the flow diagrams.

The detailed design is then worked out on P&G's production engineering model. This model, which is an accurate, true-scale development of equipment, piping, conduit, chutes and ducts in complete detail, is then transferred to the job site for use by the construction crews.

Scales used in the models: for the plot plan, about ⅛ in. to 1 ft.; for the preliminary equipment, ⅜-½ to 1 ft.; and for the production model, ¾ in. to 1 ft.

P&G makes a good case for its system of cutting back the construction costs. It points out that the average manufacturer is spending about 3% of its sales on research, while the average research tab for construction improvement is only ½%—with 95% of this small amount being spent by the materials makers. Yet, construction research has a bigger potential payoff. Because savings apply before taxes, a dollar gained by research on construction methods is a whole dollar; whereas a dollar gained by improved manufacturing is only 50¢ after taxes.

For these reasons, P&G has for several years allocated time and money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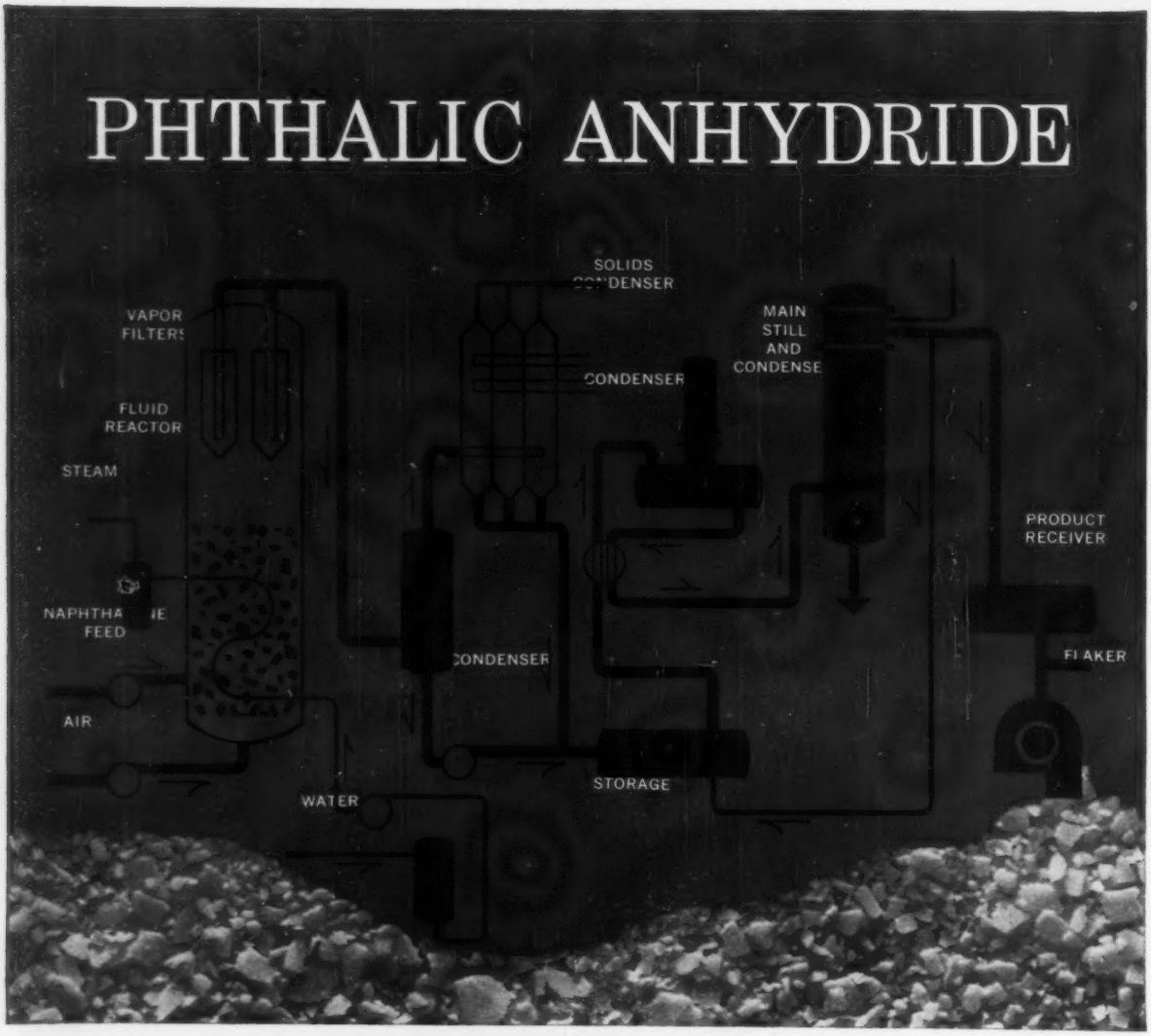

New fluid-bed process offered by Foster Wheeler

Foster Wheeler is the exclusive licensor of a new fluid-bed process specifically designed to utilize the UCC (United Coke & Chemical, Ltd.) catalyst for phthalic anhydride production.

In over three years commercial operation this process has provided long *uninterrupted* runs . . . *consistently* high yields . . . *assured* operation at rated capacity . . . and long catalyst life without reactivation. The entire operation has been virtually trouble-free.

Currently, one of the world's largest phthalic anhydride plants is being constructed using this unique fluid-bed process.

If you are considering an increase in phthalic anhydride production, it will profit you to discuss your requirements with Foster Wheeler Corporation, 666 Fifth Avenue, New York 19, New York.

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to development programs aimed at reducing construction costs in much the same manner that manufacturing firms conventionally allocate money to research. It spends this money in a program that tries to adapt the principles of industrial engineering to project design. The results are reported to have yielded $4 for each $3 invested.

This has made P&G a pioneer in the field. In the past, the firm has succeeded with models and photography to replace drawings. Now it's pushing preassemblies.

AIChE Clearing House

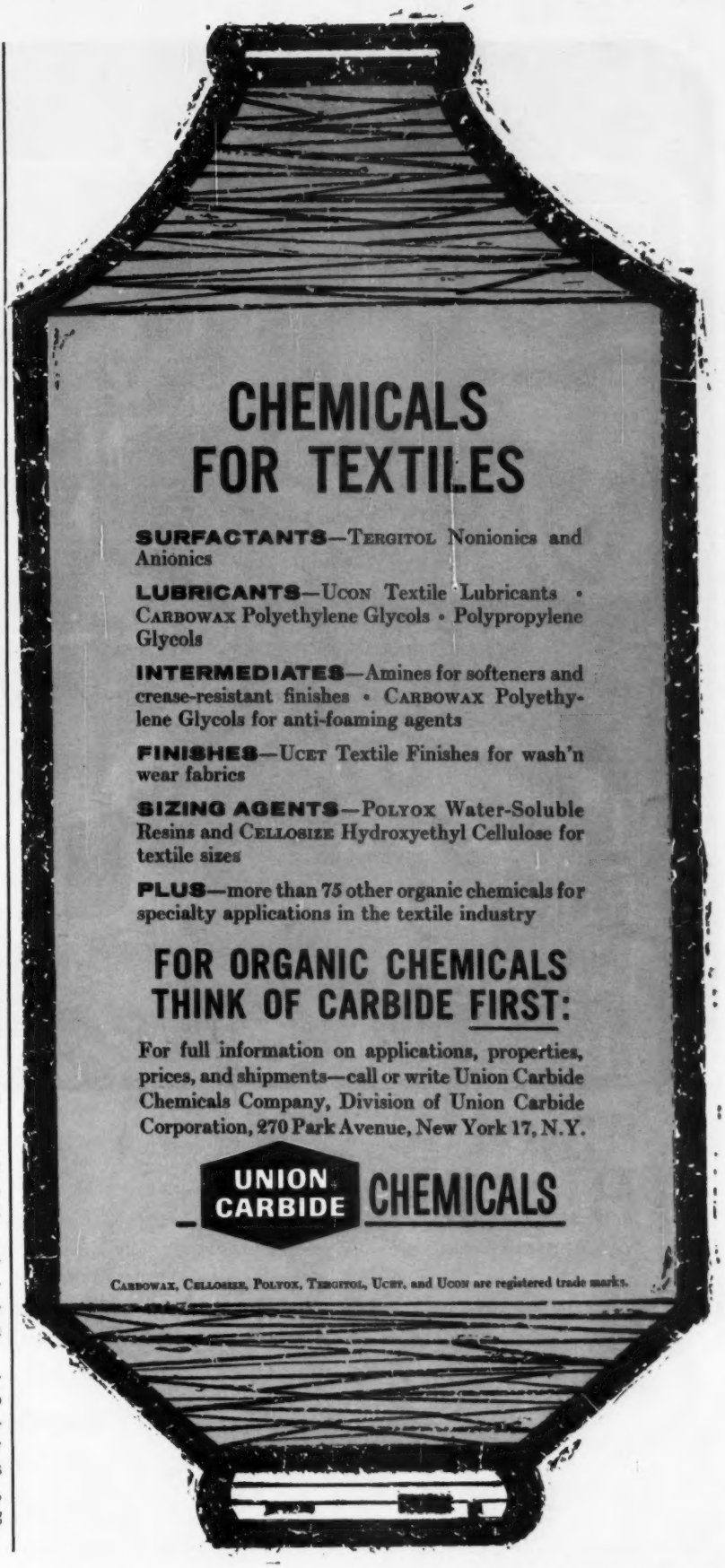
AIChE swings into action this week on a program to benefit engineers in all types of applied and basic research.

The program had its start at AIChE's New Orleans meeting last February, when the group formed a subcommittee to deal with research needs. Purpose: to act as a clearing house for engineering research. The subcommittee well recognizes that most private industry wants to keep its own research secret until the point of payoff in a patent or commercial application. But it points out that much of the research being done in the universities and institutions can be of great help.

The exchange is not to be all one-way, however. Private industry will have to apprise universities and institutions of its research directions. And this is where AIChE comes in. At present, it is soliciting suggestions for research needs. These suggestions will be:

- Cataloged and put into booklet form for distribution to universities and other interested parties.
- Screened for most urgent needs. Literature searches will be made by technical experts, and the subcommittee will distribute results in state-of-the-art reports to industry journals.
- Kept up to date. The subcommittee intends to follow research currently in progress, thus avoiding duplication. It will carry out this program through a series of questionnaires.

Industry, institutions and universities alike are urgently requested to submit a brief statement of their suggestions with an explanation of why they form a current need. Statements may be sent to Frank C. Croxton, Battelle Memorial Institute, 505 King Ave., Columbus 1, O.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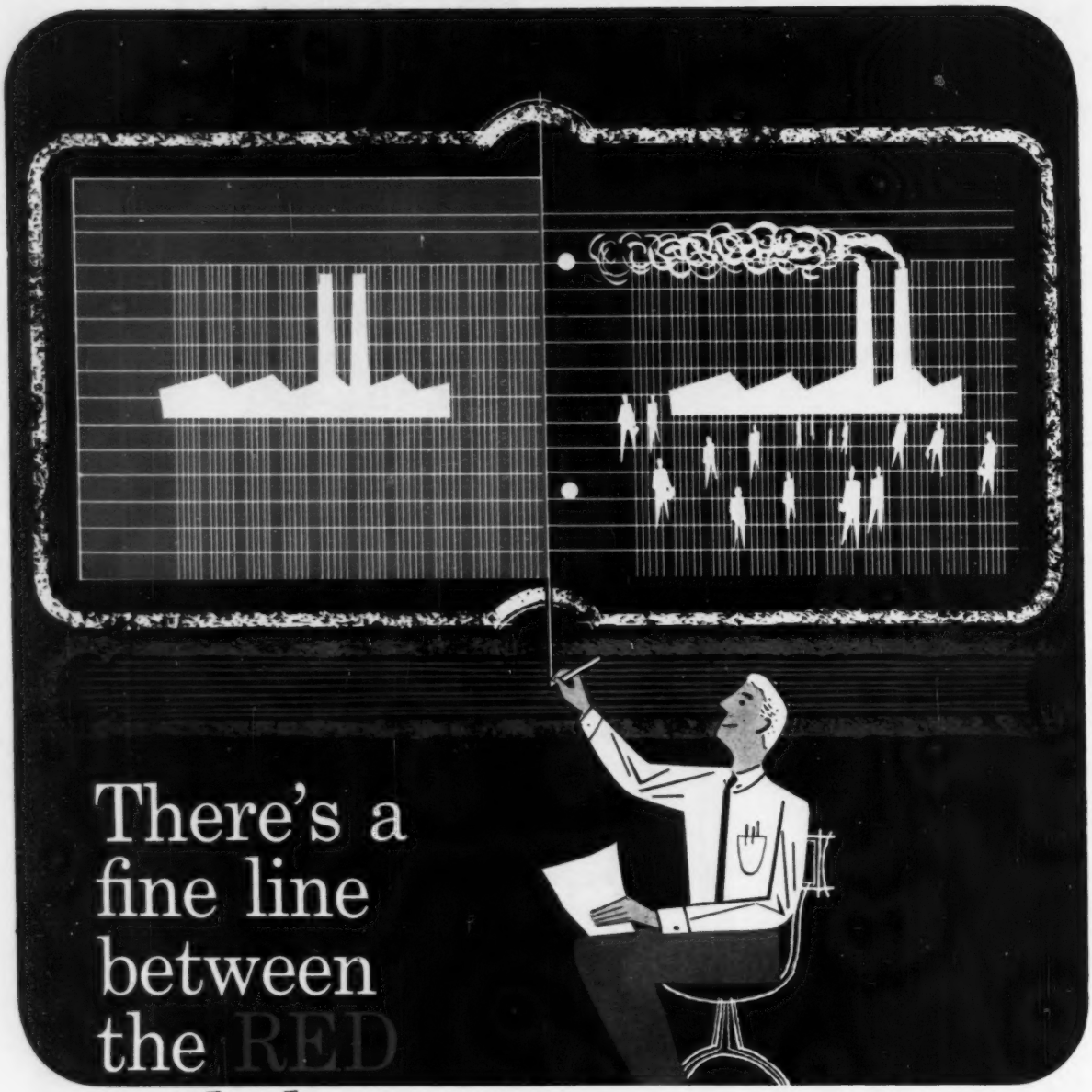

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PROCESSES

Pressure-Molding Plutonium: Scientists of the Los Alamos, N.M., national laboratory have succeeded in applying powder metallurgy techniques to plutonium, using what is said to be the most advanced technique in molding nuclear fuel elements.

A. E. Ogard of Los Alamos explained the technique at the Fourth Plansee Seminar in Reutte, Tyrol, Austria. Pellets had been made from hypostoichiometric plutonium monocarbides, containing about 20% plutonium sesquicarbide, as well as from single-phase stoichiometric plutonium sesquicarbide. The monocarbide pellets were first sintered at 2300-2650 F, then ground, repressed and resintered to obtain a specific gravity of 13.1, which is 96% that of theoretically solid metal. In similar treatment, the sesquicarbides produced pellets with a specific gravity of 12.6, or 99% that of theoretical.

Parallel work in Britain's Harwell atomic laboratory has succeeded in fabricating samples of plutonium and uranium dispersed in stainless steel. It obtained best fabrication results from pellets pressed at 1450-1750 F. This type of fuel element is held promising for use in fast nuclear reactors.

•

Cutting Catalyst Load-Time: Reloading of catalyst in tubular reactors can be speeded with a novel technique developed by J. H. Howard & Associates (Houston). The method reportedly reduces downtime for catalyst change by as much as 80%, improves the accuracy of distribution.

Key is a recently patented (U.S. 2,985,431) loading machine that can be supported from the reactor structure and lowered over one or another of the bank of reactors. Containers of fresh catalyst are delivered from the ground up to the loading machine by crane or conveyor belt. In turn, the loader distributes and dispenses measured quantities of catalyst into the reactor tubes.

How It Works: A typical catalytic reactor is 20 ft. tall, 10 ft. in diameter. It has top and bottom chambers leading to a bank of more than 2,000 closely spaced vertical tubes. During production it is shut down every 30-90 days for catalyst change. Containers of catalyst are hoisted to work-

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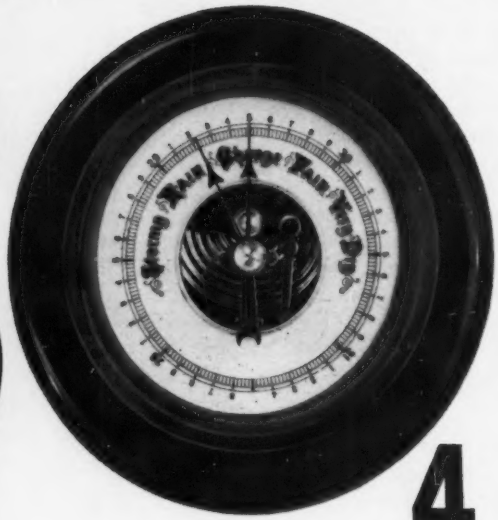
Business Barometer:

H_2SO_4



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307

Olin

CHEMICALS DIVISION

men on top, who use buckets to fill individual tubes through funnels.

The Howard process bypasses these steps. The new machine, consisting of vertical loading tubes arranged in a circular segment, fits on top of the reactor so that the tubes line up. A hopper above the machine receives catalyst from the ground, while gravity moves the flow down through the loading tubes into the reactor. This flow is controlled by means of flexible joints, which act as valves, at both ends of the loading tubes. The loading tubes are filled first and their contents are then dumped into the reactor.

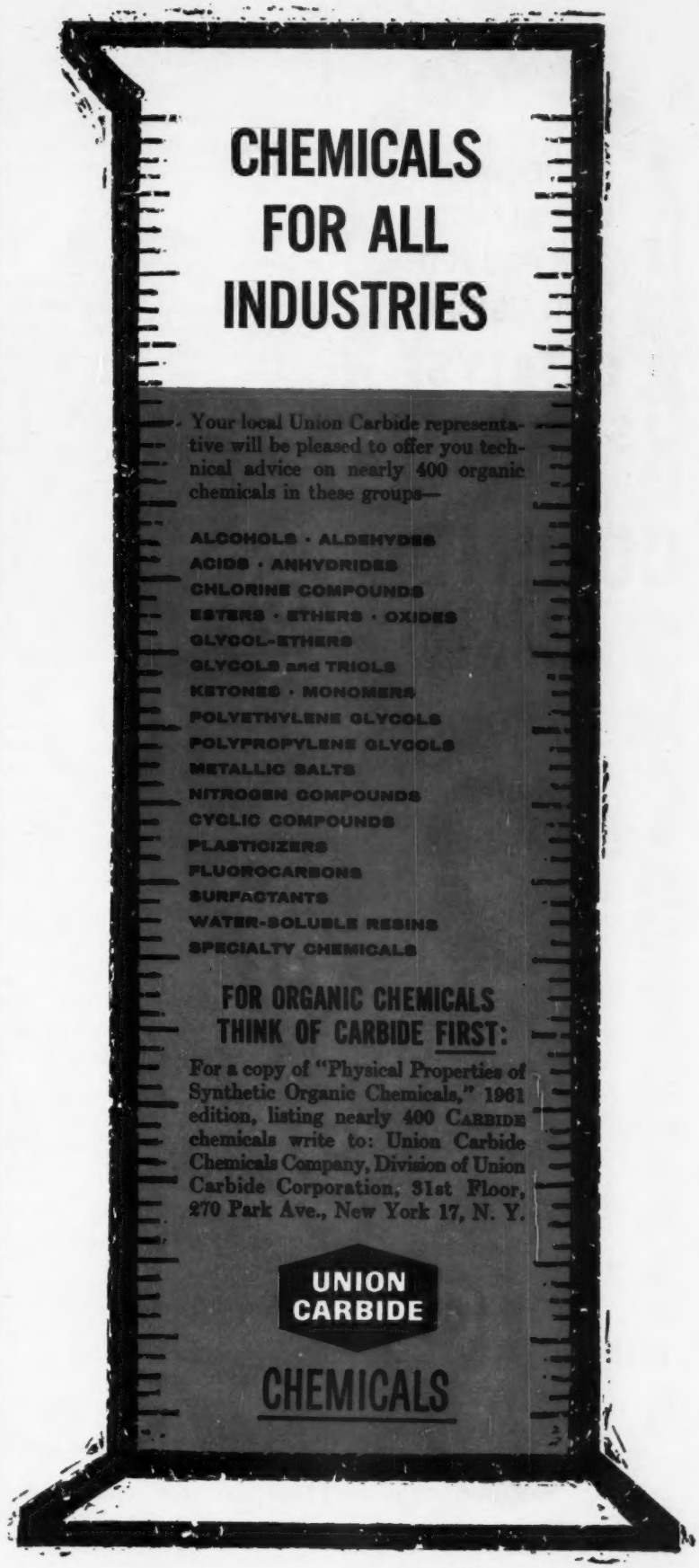
•

Getting Gas from Coal: Britain's first Lurgi high-pressure gasification plant has just gone onstream at Westfield, Fife, in eastern Scotland. The new unit, costing an estimated £6.6 million, is producing 15 million cu.ft. of gas from 450 tons/day of otherwise useless Scottish coal. A second stage, currently under construction, will boost daily output to 30 million cu.ft./day. By-products are 550,000 gal./year of tar and 250,000 gal./-year of benzole.

The plant now operating, built by Humphreys & Glasgow Ltd. (London), uses three high-pressure gasifiers constructed in Germany and a fourth that was built in Britain according to Lurgi specifications. In addition to the gasification section, the plant includes a Benfield carbon dioxide absorption plant, tar distillation unit, the benzole extraction unit, and a butane enrichment plant (which is needed to bring the product gas up to municipal specifications).

•

Interface Detection: A new system for detecting the interface between dilute and high-density pulp in multistage wood pulp bleaching has been developed by Buckeye Cellulose Corp. (Memphis, Tenn.). The usual method of keeping track of this moving interface is by temperature differential, since the dense and dilute stocks are seldom at the same temperature. But when Buckeye recently put in a second pulp mill and a parallel bleaching system, the best operating conditions required that the dilute stock temperature be raised close to that of the dense stock. To maintain a detectable and useful difference, Buckeye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Ethylene Catalysis: A new process to obtain organic compounds of aluminum, which are used as catalysts in the polymerization of ethylene, has been developed at Warsaw Polytechnicum (Poland). An aluminum-magnesium alloy (about 30% magnesium) is activated by covering it completely with a 20% benzene solution of diethyl bromide of aluminum. It is then heated to 60 C and ethyl bromide is added while mixing. By regulating the temperature and measuring the amount of unreacted bromide, the process can be controlled and free bromide eliminated entirely from the final product, diethyl bromide of aluminum. Details are available in Poland's chemical monthly, *Przeglad Chemiczny*.

•

Hungarian-Rumanian Acetone: Rumanian engineers are currently doubling the capacity of an acetone plant that uses a novel Hungarian process. When expansion is completed, the unit (near Bucharest) will have 4,400-tons/year capacity.

Key to the process is hydrolyzation of acetylene over a zinc catalyst. In the process, methane (natural gas) is converted into acetylene in a partial oxidation reaction developed at Hungary's Vesprem University. The cleaned reactor effluent, containing 6-8% acetylene, is then mixed with steam at 660-750 F and passed over the catalyst. The synthesis acetone gas contains 0.5% acetylene and about 3% methane, which are removed by secondary oxidation.

•

Slippery Solids: Either spraying, dipping or spray-tumble processes can be used to apply a new air-drying solid film lubricant developed by Electrofilm, Inc. (North Hollywood, Calif.). The new lubricant, called Electrolube, has been designed for specific lubrication applications involving extreme temperatures, wear and corrosion. It forms a solid coating (0.0002-0.0005 in. thick), exhibits a coefficient of friction as low as 0.025 under high loads, has withstood 100 hours of salt spray tests without visible effects.

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*By Mark N. Rerick, Univ. Notre Dame

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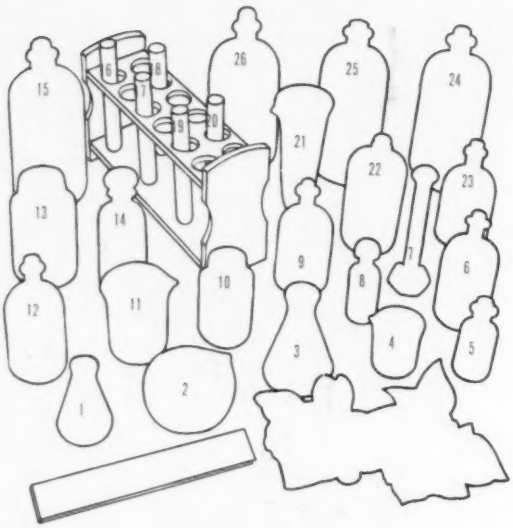

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Technology
Newsletter

CHEMICAL WEEK
July 29, 1961

A Japanese process for making acetal resins by gamma radiation of formaldehyde may be moving closer to the commercial stage. Toyo Rayon Co. has been operating a 7-tons/month pilot unit at its Shiga plant in central Japan, expects to build a commercial unit next year. However, it apparently has not decided whether to use the radiation process or try to obtain a Du Pont license.

The firm is using a 1.3-Mev Van de Graaf accelerator; polymerization temperatures are —100 C or lower. It employs nitrogen cooling.

The patent situation in Japan is anything but clear on the manufacture of acetal resins. Earlier work on radiation polymerization was done by Seizo Okamura at Kyoto University (*CW Technology Newsletter, Feb. 27, '60*). He employed gamma radiation from a cobalt-60 source, used temperatures of —80 C. However, Wooler Coal Co. of France has recently obtained a patent in Japan based on Okamura's principle. It's not clear whether Toyo, if it does use the process in its plant, will have to obtain rights from Wooler.

In any case, interest in acetals in Japan is running high. Eight other firms there are reported interested in the Toyo process. One of them, Nihon Shokubai, is already operating a 1-ton/month pilot plant using a different process, thought to be similar to Du Pont's.

•

A ruby laser has been put to work by researchers at Bell Telephone Laboratories. Crystals of potassium titanate—one to two microns in diameter—have been photographed for the first time, using the laser (optical maser) as light source. The intense beam of light, which lasts less than one-half millisecond, is described by Bell as ideal for short-exposure, high-magnification micrography and for shadowgraph and schlieren work.

•

A thermionic generator that operates on propane and air has been developed by Atomics International, a division of North American Aviation. The generator, which operates at 2800 F, is said to be the first in which conventional fuels have been successfully used.

•

Deep-sea pressure to densify and cure the large plastic "skirts" used in thrust nozzles for big rocket motors? That's the idea being put forth by Fred Fletcher, chief engineer for California General, Inc. (Chula Vista, Calif.).

The problem is that such parts are made of phenolic-impregnated glass that must be treated under heat and pressure. A pressure vessel required to handle a nozzle with an exit diameter of 14 ft. would, Fletcher estimates, weigh in the neighborhood of 250,000 lbs., cost upwards of $1 million. A number of shortcuts are available, but Fletcher believes they would all sacrifice quality. He says his idea, on the other

hand, would involve no sacrifice of quality, and it would be less costly, more convenient.

Fletcher suggests: wrap the resin-impregnated material around an electrically heated mandrel, cover it with an insulating blanket and lower it 2,500 ft. into the sea, which would supply 1,100-psi. pressure.

Materials suppliers tell Fletcher they could develop the blanket; and he points out that surplus ships would be available to haul the units. He sees no insurmountable objections to the idea so far, feels that cost could probably be halved.

•

Researchers are trying to deceive insects to death. University of California entomologists have successfully experimented with a new compound on loopers (actually semiloopers, they're moths related to corn ear worms), found that it gave better control than conventional insecticides. Still experimental, the compound is 4'(dimethyltriazino) acetanilide, made by American Cyanamid. After eating lettuce treated with the compound, the loopers stopped eating and died within five days. It's believed to be an antimetabolite, a chemical that resembles some nutritional substances so closely the insects' metabolism can't tell the difference. Says W. Harry Lange of the university's Dept. of Entomology at Davis, Calif.: "The looper apparently starves to death believing its stomach is full."

Previously, University of California scientists reported successful use of an antimetabolite spray in controlling clothes moths (*CW, March 18, p. 96*). The incentives for such work: the compounds can be relatively nontoxic to human beings; they're selective to certain insects; and they're good bets to keep future generations of insects from developing resistance to them.

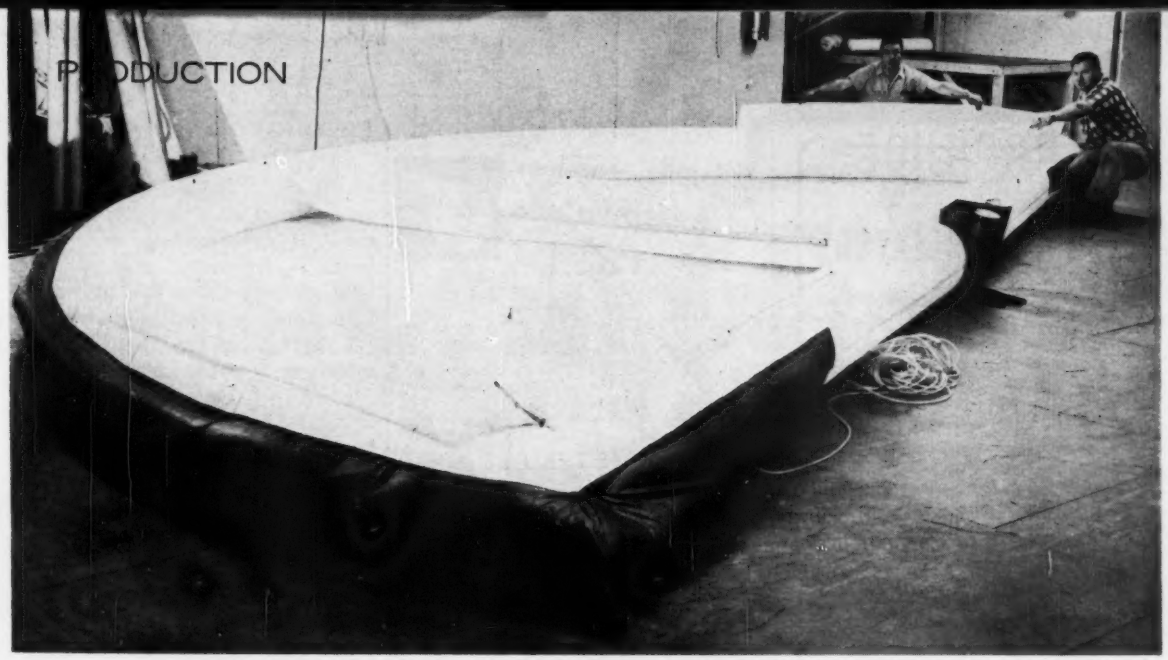
•

First large-scale field tests of gyplure have started in New England and on Long Island. Gyplure, a synthetic substance developed by the U.S. Dept. of Agriculture, attracts male gypsy moths as effectively as the natural attractant possessed by the female moth. One test now at Lake Winnipesaukee, N.H., consists of spraying gyplure to determine whether it's possible to confuse the male so that he will stay close to the ground or in tree foliage away from the females, which do not fly and remain on tree trunks.

Other possible uses for the compound: as a means of detecting new infestations at an early date or, perhaps, in trapping and killing male members in sufficient quantities to significantly reduce the moth population.

•

American Oil Co. has closed the loop at its Whiting, Ind. crude-oil distillation unit (*CW, Oct. 22, '60, p. 31*). It's using an IBM 1620, heralding IBM's first closed-loop job. The unit is rated at 140,000 bbls./day of crude oil, the biggest in the world.



Mayflower staffers give half of big Vapor Seal floating cover a last upside-down check.

Putting a Lid on Evaporation Loss

Laroche Bouvier (Paris) and Mayflower Vapor Seal Corp. (Little Ferry, N.J.) are negotiating an international marketing arrangement that promises new help in combating one of the chemical process industries' most nettlesome problems: evaporation loss. Both firms produce raftlike devices that float on liquids in covered tanks, reduce evaporation 85-95%.

Agreement between the two — which with Pittsburgh-Des Moines Steel are the world's only commercial makers of these covers—is a good sign that after five years of development floating covers are catching on.

The petroleum industry, growing increasingly aware of profits lost to the atmosphere, is now the largest user of these covers. John M. Dempster of Standard Oil (Ohio) estimates that evaporation claims $250 million worth of petroleum products each year. More than 100 floating roofs are in use, mostly in terminal storage of gasoline. The industry is so interested in these covers that American Petroleum Institute's Evaporation Loss Committee will issue a bulletin on them within six months, summarizing their pros and cons.

The chemical industry is watching these proceedings with great interest. It too would like to use the covers but realizes that there are some hurdles ahead. The big problems: compatibility with stored products (chemical plants deal with a diversity of products, some of which react with the cover material); and economics.

Also, plant engineers must decide whether the covers can pay their own way. This decision is not always easy, since many chemicals, although more costly than gasoline, are not as volatile. Cases in point: xylene, naphthalene, propanol.

Compatibility Solved: The agreement between Bouvier and Mayflower should at least help solve the compatibility problem for U. S. chemical firms. By terms of the marketing arrangement, negotiated through J. G. Devys, a New York City consulting engineer, Mayflower will be able to sell Bouvier's aluminum Aludeck throughout the Western Hemisphere—making the device available to U.S. companies. In return, Bouvier will have the right to sell Mayflower's largely plastic Vapor Seal throughout the Eastern Hemisphere. Since the degree of aluminum's resistance to corrosion by chemicals is well known, compatibility tests are not necessary when Aludeck is used, whereas they are necessary if plastic covers are used. P-DMS's Hammond Iron Works makes the Hamondflote cover, which, like Vapor Seal, also is plastic.

The agreement will also make it easier for Mayflower to handle the chemical industry's multipole tanks (those larger than 50 ft. in diameter frequently have several poles inside to support the roof). Vapor Seal isn't applicable in tanks with more than one pole, but the Aludeck is.

Same Principle: All three covers operate on the same principle. Floating directly on the liquid surface, the cover reduces the vapor space to a minimum. As the liquid level in the tank rises or falls, so does the cover, maintaining the same vapor volume. Result: evaporation is drastically reduced because the vapor has nowhere to go.

Construction Differs: Although the covers employ the same principle to cut evaporation, they differ in construction. The Aludeck consists of several aluminum panels 8-10 ft. long and 20 in. wide, bolted together and buoyed by aluminum floats. The peripheral Z-shaped seal is made of glass fiber coated with a polyester resin, which weds with any irregularities in the tank wall. The self-supporting structure is strong enough to hold a man.

The Hamondflote does not require floats, depends instead on the buoyancy of its 1½-in. urethane foam construction. The foam is covered on both sides with a 3½-mil aluminum foil laminate. The foam is compatible with gasolines and hydrocarbons but softens or dissolves in the presence

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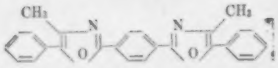

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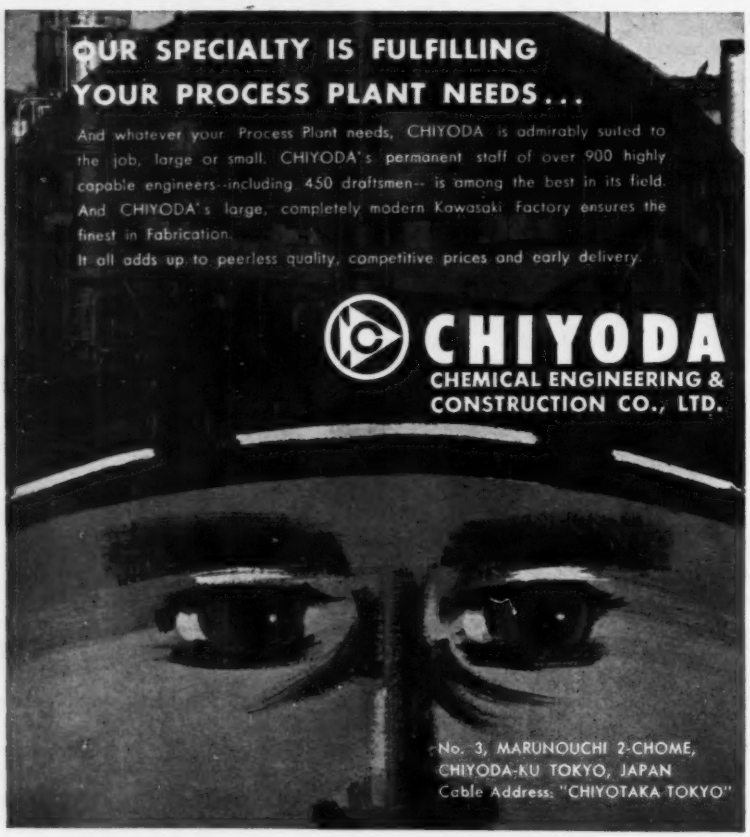
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of several chemicals—e.g., alcohol, methylene chloride, hot glycol. Hammond is experimenting with other foams.

Mayflower's Vapor Seal (on which Esso Research and Engineering Co. has the basic patent) uses either a nylon-6 or Hypalon (chlorosulfonated polyethylene) coat over a Dacron or Orlon fabric. The whole structure resembles an inverted backyard plastic swimming pool. The outer wiper (seal), a pontoonlike structure that floats the cover, consists of a 5/8-in. layer of urethane, covered with a fiber and plastic coat. It is inflated with 2 psi. air, held in by a polyvinyl alcohol bladder.

API Cites Pitfalls: The API Evaporation Loss Committee's bulletin will list the pitfalls as well as the advantages of all three covers.

One item that will get close scrutiny is the relative ease of installation. The Mayflower Vapor Seal is said to be the easiest to install. In tanks less than 50 ft. in diameter, with only one center post, four men working six hours can install a Vapor Seal through the top manhole, without shutting down the tank.

The Hamondflote must be installed through the bottom manhole in tanks larger than 20 ft. in diameter. Like Vapor Seal, it can be installed through the tops of smaller tanks without taking them out of service. The Aludeck must be installed through the bottom manhole, after the tank has been emptied and cleaned.

Another important factor: insurance rates. At least one chemical company has shied away from use of the plastic covers. Since urethane is not fireproof (even though it is self-extinguishing), its use results in higher, uneconomical insurance rates.

But this situation may ease as urethane plastic becomes a more commonly used building material and receives fire underwriters' approval (*CW, July 15, p. 22*). Moreover, new molding processes (*CW, July 8, p. 45*) promise to broaden the use of urethane foam in home and plant construction, make it more economical for use in tank covers.

As the advantages of the covers become better known and as problems associated with their use are solved, floating roofs will become a more common sight around chemical plants.

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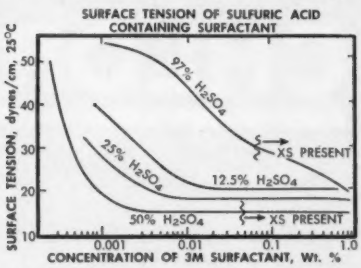

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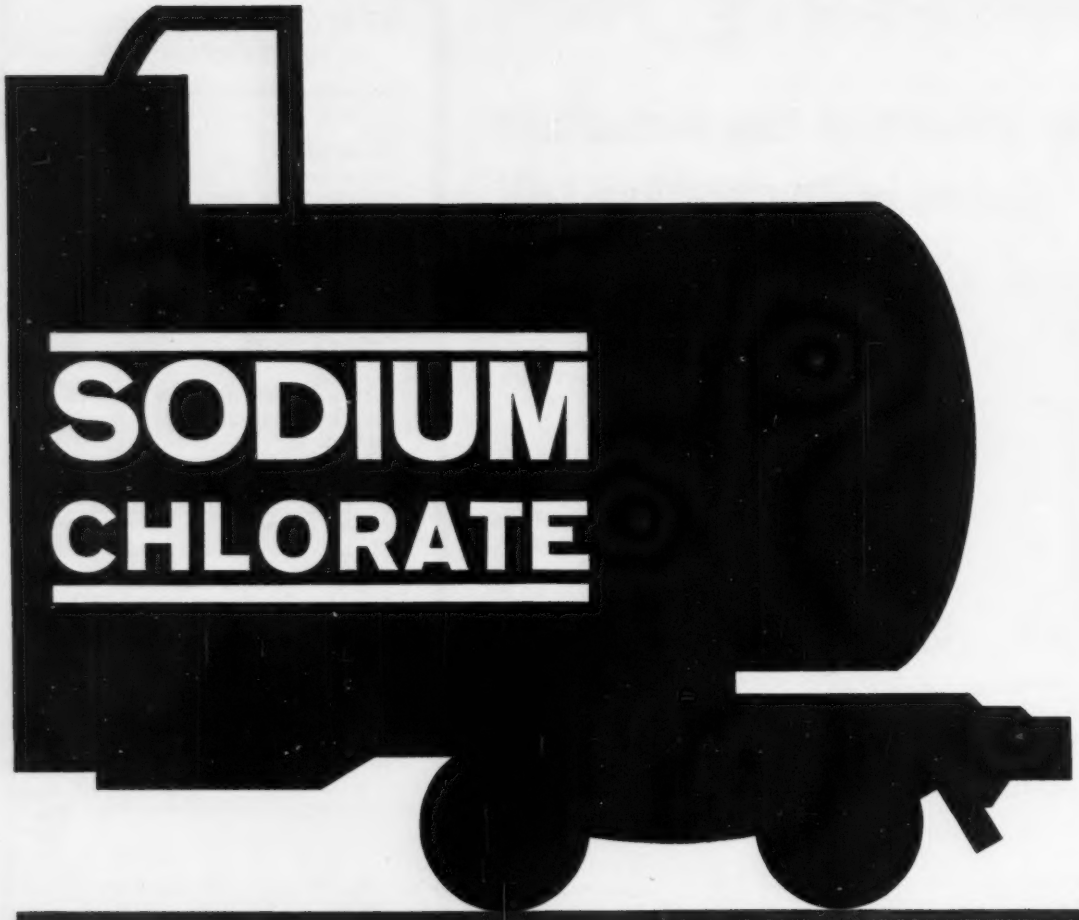

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Drug Marketing: Sweeping Changes in Troubled Times

PRICING	**Discount rates to both wholesalers and retailers are being revised, and variable-discount arrangements are gaining favor. Drug marketers are dropping their suggested retail price policies, and more pharmacists are basing their charges on cost of the drug, plus a variable markup rather than a flat percentage markup.**
ADVERTISING	**The torrent of flamboyant advertising and promotion is rapidly giving way to greatly stepped-up institutional promotions, geared to repolish the industry's tarnished image.**
SAMPLE-HANDLING	**Under heavy pressure from the Food & Drug Administration, drug manufacturers are tightening sample-handling operations.**
DISTRIBUTION	**Although they speak guardedly, many drug marketers are studying numerous methods of chopping the high costs of getting their products to ultimate consumers. Some companies even envision the possibility of selling through fewer outlets than the nation's 54,000 pharmacies.**

Drug Sellers Taking New Marketing Tack

Long beset by a host of problems, embattled pharmaceutical companies this week are well along on programs to revamp many of their fundamental marketing practices (*see chart*)—both to answer their critics and to rebuild a badly damaged public image, while strengthening their sales and profit positions.

Changes are most apparent, of course, in pricing and discount practices—which have been the chief target of the Senate investigators—but have also extended into advertising and promotion, sample handling and physical distribution. And still other changes may be in the works.

One marketing vice-president describes it this way: "We're much more deliberate about our marketing effort right now than we have been for a long while. We want to be sure we're right, so we have stepped up our clinical evaluation efforts and broadened our market research."

And, although drug manufacturers do not want to discuss their moves publicly, many have set up high-level policy review committees to go over each phase of their marketing efforts, look for areas of weakness or inefficiency.

Another problem contributing to the drug industry's current difficulties is the dearth of genuinely new products. Most drugmakers compare the present meager output of new pharmaceuticals to the lull the trade experienced after highly promising products such as antibiotics and tranquilizers had become well established in the market.

Prices Under Pressure: But many drug producers (at least in private) ascribe their current problems largely to Sen. Estes Kefauver's inquiries. Publicly, drugmakers state that the principal effect of his Senate Antitrust Subcommittee hearings has been to accelerate the schedule on numerous marketing revisions the industry had been planning.

Just last week, at the latest round of hearings, Senator Kefauver again charged the pharmaceutical industry with price gouging.

And drug marketers have become keenly concerned with the growth of cooperative prescription drug plans and their potential impact on retail prices.

Not long ago, Shering Corp.'s voluble marketing vice-president, Herman Leitzow, gave some indication of how the industry would meet the co-op threat: "Special price breaks on large-volume prescriptions may be en route," he noted.

And while many manufacturers are reluctant to discuss details of their pricing systems, it's now evident that they are establishing more equitable price levels to try to keep the "maintenance" prescription business (refills for such ailments as arthritis, diabetes, heart disease) from going over entirely to mail-order drug sellers.

The latest industry innovation aimed at altering the price structure: lower discounts to drug wholesalers. Drugmakers are plugging this strategy, asserting that it helps stabilize the business by leaving less room for price cutting.

But even more of a departure is the practice—now on the upswing—of granting variable discounts, both to wholesalers and to pharmacists. Discounts under this arrangement are figured on a variable, or gradient, basis rather than on a fixed percentage of producers' price. In effect, some drugmakers are reducing discounts on certain higher-priced items—where discounts have been quite large—and increasing them on some of their lower-priced products.

Retail Pricing Trends: Pricing of pharmaceuticals at the retail level is undergoing some marked changes, too. For one thing, many drug producers are abandoning their local price schedules and suggested retail price policies. They have been encouraged to take this tack by the recent

federal antitrust action against Northern California Pharmaceutical Assn. (*CW, July 8, p. 34*), which was fined for conspiring to fix retail drug prices.

This has caused some concern among pharmacists but paves the way for proponents of the so-called Friesenecker Plan—whereby a pharmacist charges the cost of a drug plus a flat markup, generally about $2—who are pressing to have the traditional percentage markup pricing arrangement tossed out.

Price Competition: But while the industry has been busy revamping its price and discount structures, it has faced stern competition, particularly from the cooperative drug groups and proponents of lower-priced institutional purchases based on chemical names.

The most recent of these cooperative moves is that of the Bricklayers Insurance and Welfare Fund (New York), which last month began operating its plan to provide lower-cost drugs to its members. And just a few weeks ago (*CW, July 1, p. 59*) mail-order seller Spiegel, Inc., revealed its plan to sell prescription drugs to its regular customers at what it terms a "nonprofit" price.

On the institutional front, the Veterans Administration recently disclosed (*CW Washington Newsletter, July 22*) that beginning Nov. 15 it will buy all ethical drugs needed by any of the civilian agencies of the federal government. This will include some $25 million/year worth of drugs for VA itself and an additional $15 million/year worth for other agencies.

Image-Rebuilding: Perhaps the most readily apparent switch in drugmakers' marketing strategy is in product promotion. Here, a complete turnabout from large volumes of flamboyant trade promotion material is under way with "image-rebuilding" as the main objective. Drug producers are particularly concerned about the detrimental effects drug counterfeiting is having on the general public's attitude toward the industry.

Sample handling is being tightened by drug marketers, too, under heavy pressure from Food and Drug Administration's stepped-up campaign to curb abuses. Bristol Laboratories, for example, is among those that have instituted programs to prevent sample misuse and waste.

Public relations activities have also been greatly stepped up to help offset adverse publicity.

Smith Kline & French, for one, has tacked new public relations duties onto the regular sales and merchandising activities of detail men. SKF trained 300 of its 450 detailers in public speaking; these men routinely give talks at meetings to help promote the industry.

Ad Research: These changes in the industry's promotional emphasis have kindled its interest in measuring promotional techniques and effectiveness. A just-completed study of pharmaceutical advertising research by the Advertising Research Foundation (New York) points up some current views on advertising research held by drug marketers.

Nearly all the firms replying to ARF's survey (105 out of 180) use direct-mail advertising. About 90% count on journal ads, while films and exhibits are used by 50-60% of the companies.

Over half of the firms polled report that they conduct some advertising research; nearly all the firms with larger than $10 million annual sales are doing ad research. Their chief methods: responses to direct-mail and personal contact by detail men.

Less-Costly Distribution: Despite the shifts already carried out in drug marketing, some ideas now under consideration for possible action may, if adopted, prove to be even more far-reaching. One of the most important: reducing distribution costs by eliminating "overservicing" and possibly by changing channels of distribution.

Drugmakers agree that to bring prices down they must weed out some of their more costly, yet unproductive, marketing and distribution services—e.g., free store layout and design, excessive inventory stockage to accommodate customers. In some instances, this practice merely takes the form of charging the customers for services they use.

But in other companies, the thinking on this subject ranges to the possibility of entirely bypassing some of the nation's pharmacies. These firms believe that such a large number of retail outlets (more than 54,000) complicates the job of providing adequate service, and unnecessarily inflates the cost. How this would be done is speculative, of course, and comments are guarded, but the idea is being considered seriously.

Just what lies ahead is also speculative. It's paradoxical that at the very time when Senator Kefauver would most like to spur competition in the pharmaceutical industry, Wall Streeters are beginning to talk about the increasing conservatism among pharmaceutical makers. Nevertheless, the marketing shifts already under way —aimed at improving profit performance—make it clear that drugmakers are not retiring quietly to the sidelines.

Mississippi Shortcut

Last week an important new link in the Gulf Intracoastal Waterway—the Port Allen-to-Morgan City alternate route in Louisiana was opened to shippers. The $30-million project provides cheaper, faster water transportation for chemical process companies between Baton Rouge and Gulf Coast points west of New Orleans.

The new, 19-mile link contains the largest lock in the intracoastal waterway system—84 ft. wide, 1,200 ft. long, designed for 47-ft. maximum lift. The new channel is 12 ft. deep and 125 ft. wide from Port Allen to Indian Village, and a 46-mile section of old channel lying between Indian Village and Morgan City was enlarged in the project. A 12-ft.-deep mooring basin (200 ft. wide and 2,000 ft. long) was built at the Port Allen lock.

Shippers using the lower Mississippi River expect to cut at least a day from their current barge movement time between Baton Rouge and the Gulf. Moreover, they figure to save about 50¢/ton on intracoastal movements because of the shorter route, according to William Herbert, executive director of the Greater Baton Rouge port.

Until last week CPI shippers—mostly producers of petrochemicals and other petroleum-based products —had two choices in routing cargoes to Coast points west of New Orleans: breaking up their efficient tows so they could pass slowly through the 9-ft.-deep channel of the old Plaquemine-Morgan City waterway or moving their barges 160 additional miles through the more modern Harvey Lock at New Orleans.

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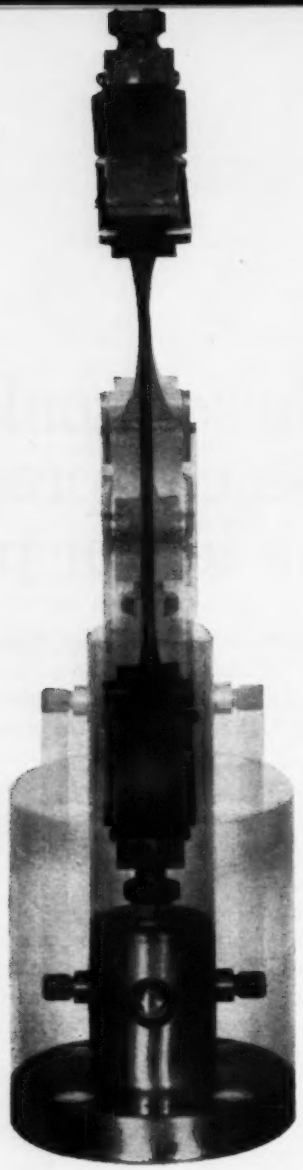

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Market Newsletter

CHEMICAL WEEK
July 29, 1961

The benzene industry is still disturbed over last week's sudden 3¢/gal. price break that brings posted schedules down to 31¢. That low level has been touched only once—in mid-'58—in the past nine years. Actually, it was clearly indicated a couple of months ago (*CW Market Newsletter, May 13*) that the benzene price might topple before summer was out.

U.S. Steel insists that it tacked up the new 31¢ tag in an effort to stabilize a market unsettled by numerous offers of lower-priced benzene made to consumers over the last few months. Reports circulating in the trade, however, indicate that the new bargain-basement benzene price is the result of some rough shuffling between Enjay Chemical and U.S. Steel for Monsanto business.

Reportedly, Enjay has been selling benzene to Monsanto at 2¢/gal. under the industry-established 34¢ price for some months. A push by Enjay to increase this business would have meant a Monsanto shift from other suppliers (including U.S. Steel). Enjay labels as untrue any report that implies it initiated the cut-price trend, indicating that its 32¢ price to Monsanto was a legitimate counteraction to a bona fide offer of lower-priced benzene made by others.

At this point, U.S. Steel allegedly undercut Enjay's price. Other makers, caught in the whirl of mounting U.S. oversupply, were obliged to follow suit to retain their own customers.

One concrete concern emerging from the current situation is that the price of benzene, also being pressured by soaring overcapacity, may have been nudged into a tumble that will take it to well under the new 31¢/gal. level.

•

More of the burgeoning benzene capacity came onstream last week when Tenneco Oil—a newcomer in the petrochemical family—started making benzene and other aromatics; all products will be sold on the open market.

In addition to benzene, the firm's new plant at Chalmette, La., can make mixed xylenes, toluene, heavy aromatic solvents, e-xylene (22 million lbs./year) and ethylbenzene (20 million lbs./year).

•

An additional boost in ethylbenzene supplies results from completion of Suntide Refining's new plant at Corpus Christi, Tex. Output: 330 bbls./day of ethylbenzene from a charge stock of 1,500 bbls. of mixed xylenes.

The entire output of ethylbenzene monomer is being sold to a "large European chemical firm". Within a few weeks Suntide will have additional material (actual amount was not revealed) for sale on the domestic open market.

Suntide—subsidiary of Sunray Mid-Continent Oil—will start building styrene and p-xylene facilities in August, expects completion in late '62.

•

Meanwhile styrene capacity continues to soar. Shell Chemical has just completed expansion of its Torrance, Calif., plant to 210 million lbs./year. Raw materials (benzene and propane) are partly from captive supplies, partly from other producers in southern California.

Cosden Petroleum just came onstream with two new units at Big Spring, Tex., bringing its total capacity to more than 60 million lbs./year; and Sinclair-Koppers joint styrene venture in Texas (70 million lbs./year) should be ready for operation late this summer (*CW Market Newsletter, June 24*).

•

A mutual marketing agreement between Union Carbide and Du Pont is simplifying the two firms' problems in marketing polyethylene film in Canada. They are cooperating to fill out their respective range of resin formulations: Carbide gets linear (high-density) PE, resins for compounding purposes, from Carbide. Canadian observers figure that the two companies probably share about 75% of the total Dominion PE film business.

The exchange deals have been going on for several months, but there apparently are no formal purchase agreements; and resin of one company is not being resold, as such, by the other. Du Pont for example, makes basic film-grade resin for the Whitby film plant, buys low-density material only for special formulations.

Du Pont imported all its film-grade resin from its parent company before Carbide started production in Canada in '58. Some market experts think the change in exchange value of the Canadian dollar may have influenced the switch from imported resin to Canadian-made material.

•

Recent sharp price cuts on oxo chemicals (*CW Market Newsletter, May 20*) led to speculation that Tidewater Oil might scrap plans to put up a 60-million-lbs./year oxo-alcohol plant adjacent to its Delaware refinery. But Tidewater says it's going ahead with the project (Air Products is doing process and design engineering) and expects to be onstream in mid-'62.

Rough competition in the capacity-heavy oxo business (*CW, March 11, p. 84*) isn't troubling Tidewater because, the company claims, it has an assured market for the entire initial output; Reichhold Chemicals reportedly will take most of it.

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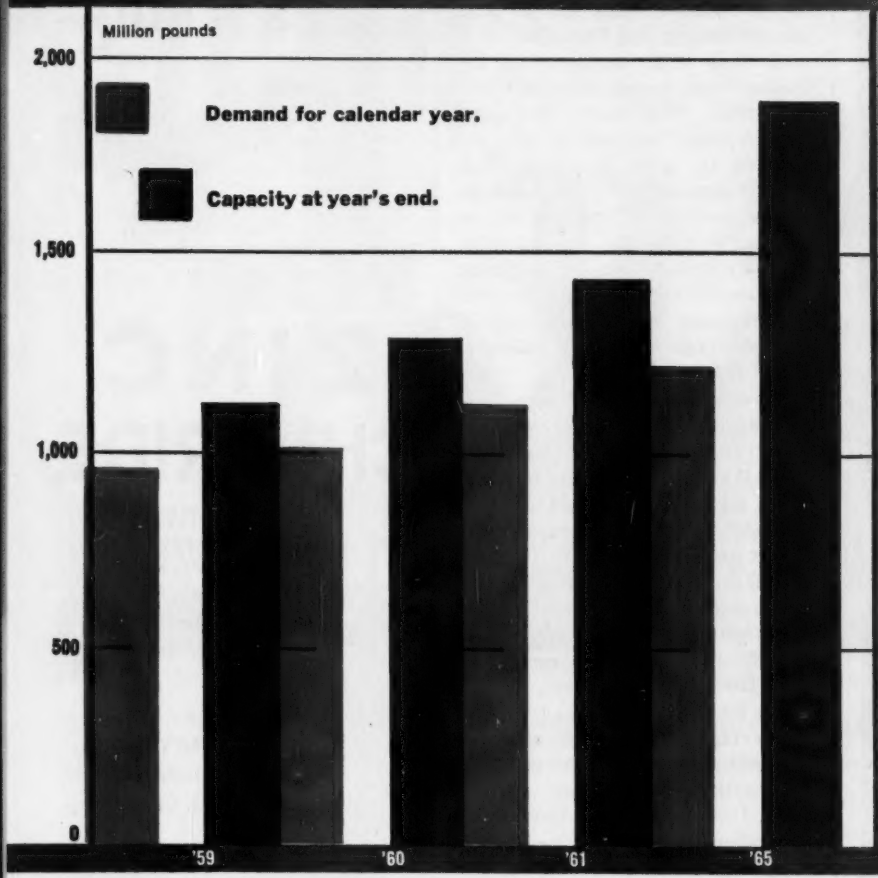
How Vinyl Chloride Demand Trails Capacity



Vinyl Chloride Monomer Price* History

	cents/pound
July 17, '61	7.5
June 19, '61	7.5
June 12, '61	8.96
April 10, '61	8.96
April 3, '61	8.91
Dec. 26, '60	8.91
Dec. 19, '60	11.3
Oct. 24, '60	11.3
Oct. 17, '60	12.5
Jan. 4, '60	12.5

*Tanks, minimum freight equalized East.

Overcapacity Dims Vinyl Chloride Outlook

After enjoying years of booming business and profitable operations, vinyl chloride producers today are feeling the pains of severe overcapacity—in the form of a deteriorating profit picture. In fact, conditions in the vinyl chloride business today are worse than they ever have been. Unless the price can be raised to profitable levels and demand stimulated beyond expectations, a long string of dark days loom for the producers.

It was during the last quarter of '60 that the supply-demand situation began to get badly out of balance. As new units rolled onstream, capacity at the end of '60 had climbed to about 1.315 billion lbs./year, but demand during the year inched upward to only 1 billion lbs./year.

And the situation is getting worse. By the end of this year, capacity will have reached 1.445 billion lbs. Also, if announced plans for other new plants are converted into actual production units, capacity will be 1.885 billion lbs./year by mid-'62.

Demand Lags: Meanwhile, demand for the raw material probably won't keep pace—even by '65, when optimistic marketers predict demand will hit 1.5 billion lbs./year.

The exploding capacity buildup has led to a major headache for producers: the vinyl chloride price structure is crumbling as fast as new production units are built.

During the first three quarters of '60 the vinyl chloride monomer price held at the 12.5¢/lb. level. But in the last quarter, three new plants, with a combined capacity of about 100 million lbs./year, went into operation, and other expansions entered final stages of completion last fall. Result: the price began to slide. On Oct. 22, '60, it slipped to 11.3¢/lb., and by the end of the year was down to 8.91¢/lb. It rallied in April of this year, to 8.96¢/lb., but then dropped to an all-time low of 7.5¢/-lb. during June, where it is today.

Behind the Cuts: Vinyl producers generally won't speculate about why such drastic price cuts took place. It's generally believed, however, that the reductions were an unsuccessful last-ditch attempt by established producers to discourage others from

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entering the field—principally Monochem Inc. and Tenneco Chemical Co.

Allied Chemical was the first company to officially post a lower price in '60. Allied explains that its price cuts, in October and December, were made only after reports that the monomer was moving at below-scheduled price. "We merely met competitive offers," says Allied.

Today the price appears to have reached bottom at 7.5c/lb., and no further cuts are expected in the remainder of this year. On the other hand, it's unlikely that anything more than fractional increases will be posted. Producers have little to say on this subject, since no one is willing to tip his hand.

Polymer Prices Also Down: Concurrent with lowering of the monomer price, polymer tabs dropped substantially. But consensus of trade observers is that the lower price will not give added stimulus to the polymer's market growth.

Still, the PVC market is a big one and demand for the material and its copolymers is expected to grow briskly during the next several years, probably 100 million lbs./year, to 1.5 billion lbs. by '65.

The biggest percentage gain for PVC will be scored in sheeting, molding-extrusion and flooring applications. These three alone took about 500 million lbs. of resins in '60, will likely take more than 900 million lbs./year by '65.

Most unsettling to the over-all supply-demand balance are the plans of Diamond Alkali, Monochem and Tenneco to construct a total of 440 million lbs./year of additional vinyl chloride plant capacity. Although Tenneco has not yet started to build its monomer unit, there is every indication that the company intends to go through with its construction plans.

Outlook: In sum, vinyl chloride apparently is heading for one of the gloomiest periods of its long existence, and there's nothing in sight to change the situation.

Capacity will lead demand by over 600 million lbs. by the end of '62; prices are at rock bottom with no sign of a rise to profitable levels.

The story of overcapacity and depressed prices is an old one for the plastics industry, but the magnitude of the difficulty in this case makes the situation especially bleak.

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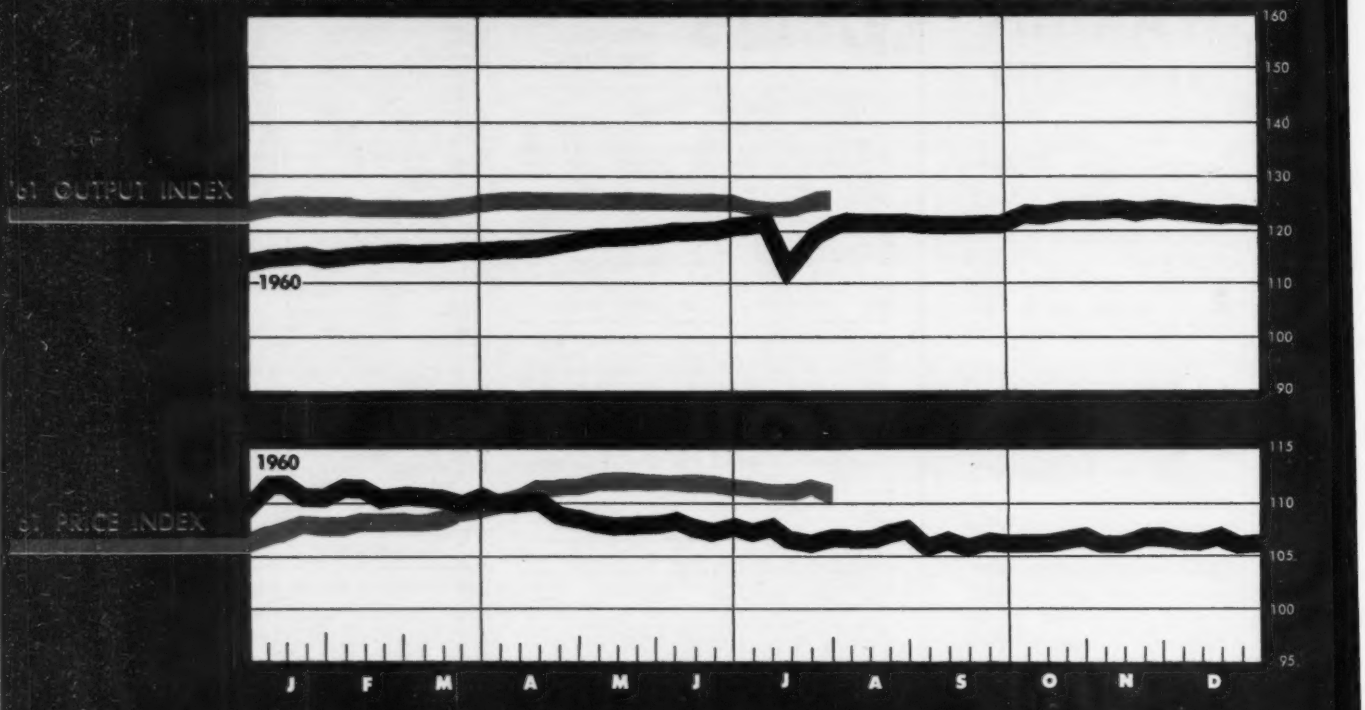
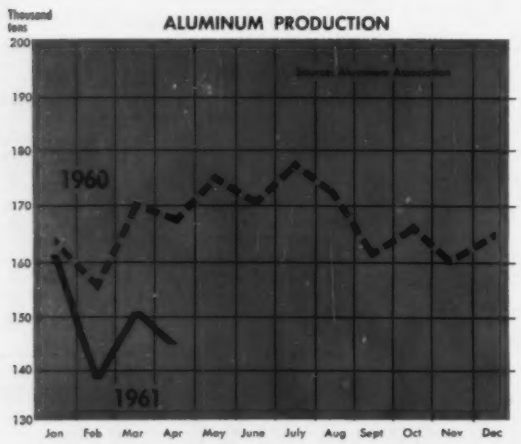


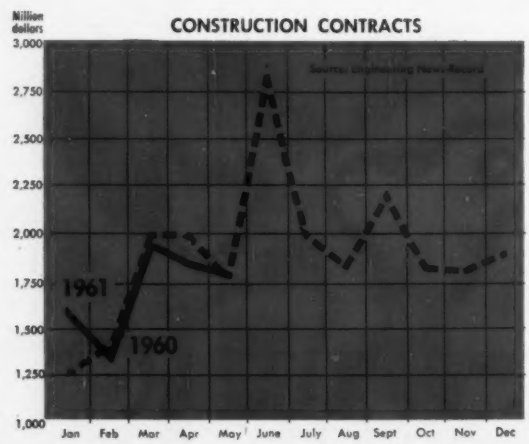
JULY 29, 1961

WEEKLY BUSINESS INDICATORS	Latest Week	Preceding Week	Year Ago
Chemical Week output index (1957=100)	124.6	124.5	123.0
Chemical Week wholesale price index (1947=100)	110.8	111.8	107.3
Stock price index (12 firms, Standard & Poor's)	52.71	53.08	48.83
Steel ingot output (thousand tons)	1,860	1,779	1,476
Electric power (million kilowatt-hours)	15,071	14,133	14,608
Crude oil and condensate (daily av., thousand bbls.)	6,730	6,970	6,832

FOREIGN TRADE INDICATORS (Million dollars)	EXPORTS			IMPORTS		
	Latest Month	Preceding Month	Year Ago	Latest Month	Preceding Month	Year Ago
Chemicals, total	141.0	158.4	150.6	34.7	40.4	34.0
Coal-tar products	14.5	16.4	17.5	6.5	7.6	4.4
Industrial chemicals	22.6	26.4	27.8	10.9	11.8	11.2
Medicinals and pharmaceuticals	23.0	25.6	23.9	2.8	2.9	2.3
Fertilizers and materials	13.4	9.2	7.8	12.3	15.6	13.9
Vegetable oils and fat (inedible)	12.2	4.6	11.6	5.2	6.5	8.0

CHEMICAL CUSTOMERS CLOSE-UP





Excitement... about a new chemical fresh from Research and Development!

B&A® SULFAMIDE

Recently, one of our ads went on a "fishing expedition" to explore possible uses for a number of new chemicals. *Among them was B&A Sulfamide.* So much interest was expressed in Sulfamide that we are taking this opportunity to tell you more about it.

B&A Sulfamide is similar to urea in many of its reactions, except that it is more acidic, and can act as a dibasic acid. Here are twelve properties and reactions of this interesting new chemical. Do they give you some ideas of your own?

Nitration

$NH_2SO_2NH_2 + HNO_3 \longrightarrow NH_2SO_2NHNO_2 + H_2O$

Chlorination

$NH_2SO_2NH_2 + HOCl \longrightarrow NH_2SO_2NHCl + H_2O$

Salt Formation

$NH_2SO_2NH_2 + 2NaOH \longrightarrow NaNHSO_2NHNa + 2H_2O$

Various mono- and di-metallic salts have been made.

Heat

$NH_2SO_2NH_2 \longrightarrow NH_2(SO_2NH)_xSO_2NH_2 + (SO_2NH)_3 + NH_3$

Hydrolysis

$NH_2SO_2NH_2 + H_2O \longrightarrow NH_2SO_3NH_4 \xrightarrow{H_2O} (NH_4)_2SO_4$

Sulfamide is stable in dilute acid or alkaline solution.

PCl_5

$NH_2SO_2NH_2 + 2PCl_5 \longrightarrow SO_2(N{:}PCl_3)_2 + 4HCl$

Alcohols

$NH_2SO_2NH_2 + 2ROH \longrightarrow R_2O + NH_2SO_3NH_4$

Sulfamide is a strong dehydrating agent under some conditions.

Organic Acids

$NH_2SO_2NH_2 + RCOOH \xrightarrow{Pyridine} RCONH_2 + ?$

Amines

$NH_2SO_2NH_2 + RNH_2 \longrightarrow NH_2SO_2NHR \xrightarrow{RNH_2} RNHSO_2NHR + NH_3$

Primary and some secondary amines react thus.

Acylating Agents

$NH_2SO_2NH_2 + RCOCl \longrightarrow RCONHSO_2NH_2 \xrightarrow{RCOCl} RCONHSO_2NHCOR + HCl$

Acid anhydrides react similarly.

Aldehydes

$NH_2SO_2NH_2 + C_6H_5CHO \longrightarrow NH_2SO_2N{:}CHC_6H_5 + H_2O$

Other aldehydes may form methylols or resins, depending on conditions.

Isocyanates

$NH_2SO_2NH_2 + RNCO \xrightarrow{Base} NH_2SO_2NHCONHR$

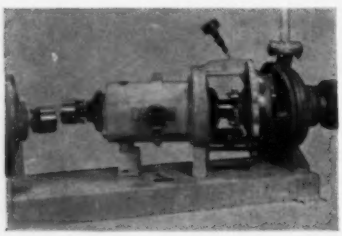
For more information about B&A Sulfamide, and sample quantities, write us today!

BAKER & ADAMSON®
Fine Chemicals

Allied Chemical

GENERAL CHEMICAL DIVISION
40 Rector Street, New York 6, N. Y.

Some fundamentals of centrifugal pump design for the chemical process industries



The primary pump problems in the chemical industry involve materials of construction, gland and seal leakage, and bearing failure. Unless pumps are specifically designed for chemical service, unless materials of construction are selected to handle specific corrosive conditions, unless maintenance is simple and parts standardization is high your pumps may be the biggest headache in your entire operation.

Materials of construction

DURCO has spent 50 years developing alloys and materials for practically any corrosive service.

Pumps and pump parts are available in fourteen standard and many special corrosion resistant alloys. All of these are cast in the Durco foundry to retain complete responsibility for the excellence of your equipment.

Chlorimet 2	Ductile iron
Chlorimet 3	18-8-S (304 s.s.)
Durco D-10	18-8-S-Mo
Durichlor	(316 s.s.)
Duriron	Monel
Durimet 20	Nickel
Durcon (modified epoxy resin)	Ni-Resist #2
	Inconel

Specific design for Chemical Service

Shaft run-out and deflection have been the major causes of seal deterioration, gland leakage and bearing failure in pump operation. DURCOPUMPS have shafts with diameters substantially larger than those traditionally used in centrifugal pumps. Shafts have a maximum run-out of .0015" with centerline deflection of no more than .005" at the impeller under maximum hydraulic load. Bearing housings are a thru-bore design, assuring perfect alignment. With this minimum deflection, packing and mechanical seals last far longer under operating conditions.

Long bearing life

Reduced shaft deflection has made it possible to build Series H pumps for 3500 rpm operation. Heavy duty bearings are selected for a minimum life of two years at this speed under maximum operating stress. The normal life is many times greater than this. Bearings are sealed against oil leakage and external contamination by Durco designed Teflon* lip seals.

Many additional features designed into the Series H Durcopump give maximum flexibility in service. The casing is end suction, top center discharge and self venting with integral feet. Since it uses a rear cover closure, the pumping unit can be removed without disturbing the casing or disconnecting the process piping. *No drilled holes enter the casing at any point.*

Impellers are threaded into the pump shaft, eliminating the impeller nut, and thereby greatly reducing the required NPSH. Head and/or capacity for any pump may be changed merely by changing the impeller diameter. A horizontal seal ring permits adjustment of the impeller without increasing stuffing box pressures.

By the use of an adapter between the casing and bearing housing, eight pump sizes can be mounted on one bearing housing, utilizing one shaft. As a result, just four bearing housings will handle the complete range of Durcopumps. Since each is engineered for the maximum pump size in its range, most Durcopumps will have a built-in safety margin far beyond normal service requirements.

Simplified Maintenance

Simplified, low-cost maintenance results from maximum parts interchangeability and minimum down-time.

Bearing housings, shafts, and frame adapters on all Durcopumps are interchangeable over a wide range of pump sizes. A complete range of pumps can be maintained in your plant with a surprisingly small spare parts inventory.

The foot mounted reverse casing design was first applied to chemical pumps by Durco. This design holds process down-time and maintenance costs to a minimum. Pumps are designed for single trade maintenance. A millwright or mechanic can remove all rotating parts of a Durcopump from the casing in a matter of minutes. Neither the piping nor the motor need be disturbed. This means that rebuilt or new assemblies can be installed with little or no realignment.

Durcopumps are available in sizes from 1" x 1" to 10" x 8" with capacities from ½ GPM to 4250 GPM, and heads to 345 feet. Durco also manufactures self-priming and submerged pumps for most corrosive services.

You will find that your local Durco Engineer is a reliable source of information on pumping problems and equipment.

**DuPont registered trademark*

THE DURIRON COMPANY INC., *Dayton, Ohio / Serves the process industries*

DURCO